MODEL AIRPLANE NEWS

JUNE 1955 — 35 CENTS

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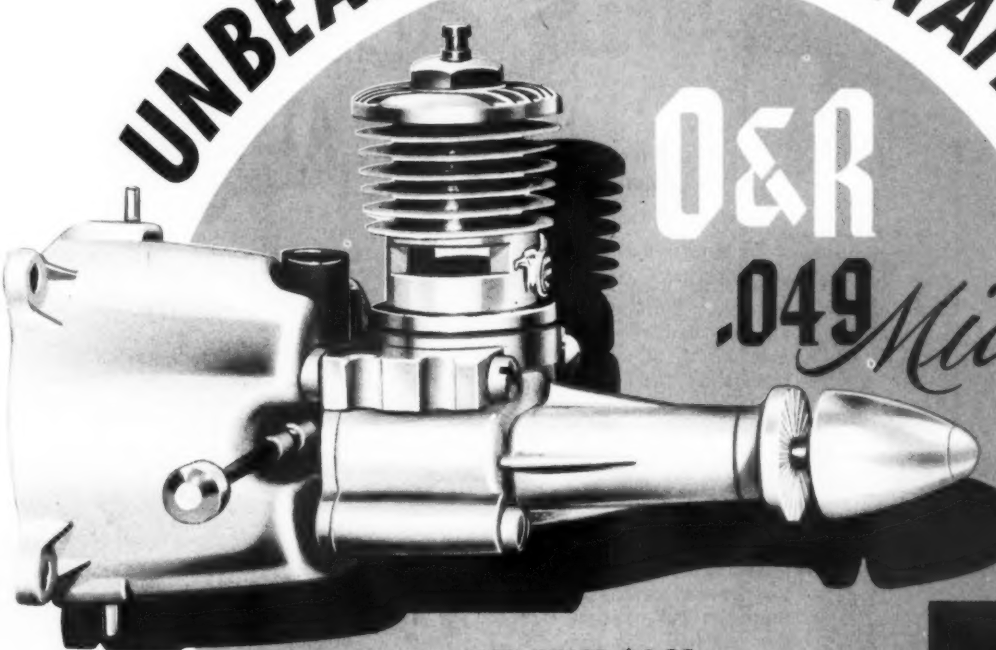

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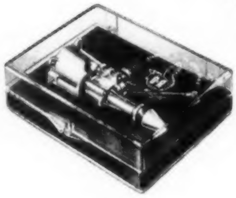

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THIS .049 engine is a midget in *outside appearance* only.

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The Fuel with the Highest Octane Rating in the Model Field! Exactly the correct octane rating to combine with the O & R .049 Midjet and Kwik-Start Glow Plug and deliver maximum power. As with all O & R Fuels, super-octane O & R AA has special detergent added to keep engines clean and smooth running.

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26th Year of Publication

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CONTENTS

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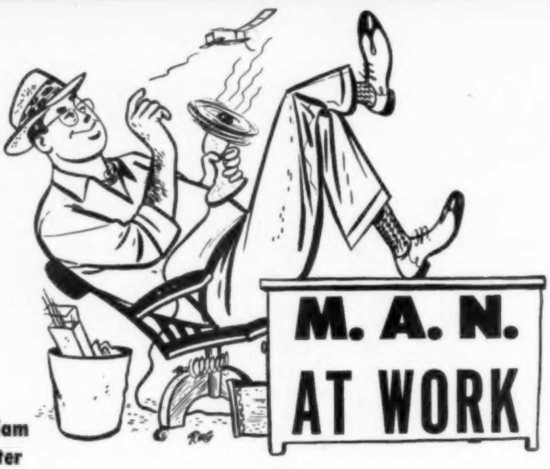

M. A. N. AT WORK

by William Winter

▶ Our many friends in the industry insist the public no longer wants to make an airplane the hard way from an old fashioned kit, but all we know is that younger readers keep heckling us for things that can't be had. Plastics, shaped blocks, wings are wonderful but concentration on the finished or highly prefabricated item is so complete that a void has been created in another part of the field. How does a kid become a real modeler? For instance, how does he learn to cover?

Should a magazine publish simple rubber-powered models and gliders? MAN thinks so. Take Tufnut, a rubber job in the January, 1955 issue. "I liked your model Tufnut," said Frank Morra, Jr., Pittsburgh. "It got me started in the right direction." That model, incidentally, had a built-up, paper-covered wing. It could have been sheet balsa, but we wanted our small fry followers to learn by doing.

Why it isn't easy to help beginners was pointed up by R. A. Hancock, Fort Worth, Tex., who told us, "I've been laid up four months with a broken leg, so decided to try Zippy and Cloud Tramp. They were so simple and looked so good and fitted my condition. That was before I tried to buy such things as hard wood wheels, certain sizes of balsa, etc."

And from A. C. Becker, Galveston, Tex.: "Surprised and pleased by the Tufnut—and to see you devoting space to rubber models. Gas models are interesting but cost and experience kill the model bug in many a fellow. And you need space to fly them. Lots of flying can be done with rubber jobs in vacant lots.

"I've visited model shops in Galveston, Houston, Dallas, Austin and Fort Worth and it has amazed me how little stuff there is for a fellow interested in rubber models. Yet these same operators have told me they have a great many requests for rubber models. Are the big model houses deemphasizing the rubber models?"

* * *

▶ "We need your help desperately in Zanesville, Ohio," cries Al Richardson (841 Brighton Blvd.). "For the past three or four years activity has been dead. Yet we have several hobby shops and kits like Berkeley's P-40 disappear from the shelves, so there must be active fliers. We are starting a club, the Zanesville Cloud Hoppers, have plenty of ukie space, an invite hobbyists hereabouts to join with us."

Speaking of clubs, note that the Model Airplane (*Continued on page* 6)

NEXT MONTH'S COVER
Gulfhawk

PLANE ON THE COVER

Greatest of all Mustangs was the P-51H built in 1946. Some 15,000 Mustangs had been made, but the H had been described as cleanest of all fighters of its times. A 1,430 hp Packard-built Rolls-Royce Merlin engine gave it a top speed of 471 mph and a ceiling of 42,000 feet. Drop tanks boosted range to 2,500 miles.


OK CUB .049A
NEW!
POWERFUL!
COMPLETE!
Brand New Design!
. . . special for control line flying. Lightweight, oversize fuel tank gives you winning range and power, plus greater output on a power/weight ratio. Mounts flush on the face of your plane. Comes complete with prop, spinner and super-capacity fuel tank. $4.95
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Here's a flashy performer with plenty of power for general flying. Has both radial and lug mountings. It's versatile, comes already assembled. Complete with fuel tank, prop and spinner.
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BUILD YOUR OWN MODEL ENGINE
KNOW your engine . . . assemble it yourself! Learn your engine from the inside out . . . and save $1.00! Includes all the parts and complete instruction for assembling the Cub. 049B.
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A Complete Line of PROVED Miniature Engines and Accessories
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Flash News

Many developments push back the air frontier -- this monthly report will keep you in the know.

▼

By JOHN F. RUDY

A global aerial pipeline for defense has more truth to it than imagination. Objectives are threefold: to cut costs, to speed logistics, to get away from reliance on surface transport. Air Force will soon contract for another 40 to 50 four-engine planes from private contractors. They'll help move supplies from American bases to those in England, France, French Morocco, Japan, Alaska and Greenland. Returning flights will carry engines for U. S. overhaul. This, alone, could cut the 270-day engine overhaul cycle (by using surface transport) to 100 days.

A bigger airlift for defense will save millions. Here's how: In Alaska, for example, by flying materiel direct from Utah, it has been possible to cut supply inventories, eliminate warehouse space, use less personnel and save money on shipping costs. At one base the 120 days' supply of 350,000 items was cut to a 45-day supply of only 150,000 items.

The era of the atomic-powered freighter, able to fly anywhere with hundreds of tons of cargo or personnel, moves closer. One nuclear engine for this purpose is well along in development.

In 1945 the Navy bragged about combatant type freighters. In 1955 it's the Air Force's turn to boast of a combatant air freighter. These will be Lockheed's new C-130A Hercules, a four-engine turboprop of 15,000 hp (enough to pull four 40-car railroad trains) that will be in production shortly. Wingspread is 132 ft.; fuselage, 95 ft.; height, 38 ft. But it stands only 41 in. off the ground. The cargo compartment is longer and wider than a standard railroad freight car, can carry up to 20 tons. Top speed is secret, for now.

Bison, Badger and Bull will become better known in the near future. They are the names Ground Observer Corps (GOC) has given Russia's bombers, silhouettes of which will be available soon to GOC'ers. The Bison is in a class with the B-52, SAC's newest, biggest jet bomber. But it has only four jets to the B-52's eight. The Badger is similar to the B-47, although its two engines in the wing roots compares with the 47's six. The Bull is about the size of the B-29 and there may be almost 1,000 of them. The three names have been adopted under a system approved by the U. S., Canada and Britain for designating Soviet planes.

Oh! The problems of aircraft in the near future! Scientists wearily scratch their chins. Foremost is that of heat and cold at high speeds and altitudes. There is a thermal barrier, too. Flying at 36,000 ft. and above Mach 1 creates a temperature rise of 97° F. At Mach 1.5, the heat rises to 212° (water boils at this). At Mach 2 (1,320 mph), temperature advances to 357°. Deduct outside air heat of usually minus 122° and a generated heat of 257° must still be dealt with. Electronic equipment is especially affected. So far, just not built to take such heat or cold. It and the pilot must be kept under refrigeration. Even fuel tanks will have to be refrigerated. At 40,000 ft. gasoline boils at around 990 mph.

The growth of tremendous trifles. That's how some scientists see turbojet development being stifled. A maze of equipment is beginning to cover the outside of the average turbojet. Extra equipment is put on during the life of the powerplant. Accessory details -- pipe fittings, solenoids, control levers, etc. -- are often the items grounding the plane because they seem unimportant in relation to the main powerplant and thus do not get the careful study of major units.

Turbojet performance demands increase at an alarming rate. It took 50 years to get to Mach 1; now all the talk is Mach 2. Here are some of the problems baffling the engineers: Supersonic speeds increase air swallowing capacities (required for high thrust) and create new vibration difficulties. Oil or lubricants may have to cool turbojets as air gets too hot at supersonic speeds. Steels have been developed to take up to 555°C. But no lube so far will stand this. Some synthetics will take 200°C, but those that can operate at 350°C will soon be imperative. How to get enough fuel into tomorrow's turbojet is today's headache. Pumping capacities of 15 to 30 tons of fuel per hour will be needed. Another answer might be to find fuels with more heating values than the 18,000 BTU per pound of normal hydrocarbons.

Here's an important trend reported by a top aircraft engineer in Canada: Engine and fuel rate of a plane designed to fly at Mach .5 goes up (cont. on p. 54)

MAN at Work

(Continued from page 2)

Doctors (Russ Sottosanti, 113 Keane St., Easton, Pa.) can be initialed "MAD." Easterners say their meets are tops. Club paper called Vapor Trails... Unaffiliated modelers around Niagara Falls, Canada, contact Niagara Aeronauts (Bob Gauthier, 2072 Murray St., Niagara Falls, Ontario). Strong on sport flying... And if you'd like to visit western Canadian contests, drop a line to Mrs. Florence Holm, Vancouver Gas Model Club, No. 9-1552 E. Pender St., Vancouver 6, B.C.... Over the hump on the Van Cortlandt Park flying site, New York. Open all year to modelers. Permits can be obtained to run U-control contests. Race car enthusiasts who would like in on this deal contact Joseph Forschay, Administration Bldg., Van Cortlandt Park. Word is the park will consider a track (Brown's Hobby Center, take a bow!).

* * *

▸ Over to the Lackawanna Terminal, Hoboken, N. J., to judge a contest sponsored by the New York Society of Model Engineers. The Society has a membership of about 200. Permanent railroad exhibit which could easily be the biggest and most elaborate in the world. It duplicates route from Jersey City to Scranton, Pa., complete with towering mountains, Delaware Water Gap, and can handle about 35 to 40 trains at a time... And to Republic for their annual employes' hobby show. (Here's where three people get shot!) Republic Rams, the model club. No one had ever built indoor before, but small flimsies the rage during the winter, also VTO'ing (landings, too) indoors with Half-A. It's the prop choice, they say... And to the New York Toy Fair. The Model Industry is to the toy business as the earth is to the sun. Few dozen model plane exhibitors. Reminded of real session with Lou Andrews, Guillow designer, re two new stunters: the Trixy (a swept profile for big engines) and the Reactor (a flying wing combat, somewhat bigger than the Half Fast). Lou tried three variations of each ship, checking for airfoils, sweep angle, etc.; then went through five sets of each, adding up to 30 test crates. He even cracked them up on purpose to learn what could be beefed. On the symmetrical wing, says a fairly sharp leading edge necessary; rounded edge causes porpoising. High camber point back 40 per cent, sweep angle, 12°. This, we submit, is the way a manufacturer should tackle a design project.

* * *

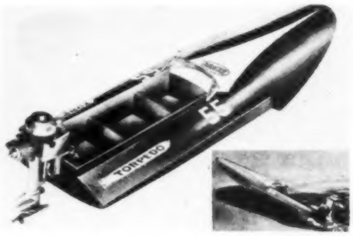
▸ How to cover with silk and paper, expert demonstration at recent meeting of Norwood Society of Model Engineers, Norwood, Mass., according to their Newsletter. Good idea... City of St. Clair Shores, Mich., has a list of things to improve the modelers' flying site. How's that? According to club paper, Gas Fumes, city's Recreation Director had promised an equally good site when expanding industrial area knocked out old field. Says editor Howard Lewis, "Our flying field, developed by us, is one of two public picnic spots. When adequate public recreation is national problem, city council should promote our program. Big contest next summer will give city several thousands of dollars of publicity." That's right, boys, show 'em how modeling pays off! Tie-in with national benefits, we'd say. What Town Father can argue then? ... Seventh Annual California Hobby Show, held April 22-May 1, pulled 200,000 spectators. FAST club members put on Carrier demonstration in fenced 50-ft. circle on 15-ft. Carrier and with no curved deck! ... Nation's busiest modelers live in Greater Cleveland, claims the Cleveland Press, which paper has carried for 20 years a three-times-a-week model feature, edited by Chuck Tracy, ex-AF pilot, Wakefield team member (1936).

(Continued on page 53)

TRADE SHOW

MONTHLY REVIEW OF NEW PRODUCTS, OTHER INTERESTING ITEMS WORTH ATTENTION

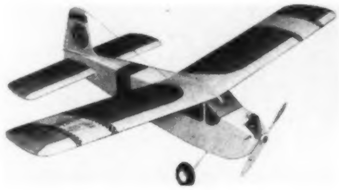
▸ *Fokker Triplane:* Half-A controlline kit by Cavacraft (2045-47-49 Trenton Ave., Philadelphia, Pa.) features construction that combines prefabrication and preassemblage. Carved cowl, ply struts, colorful decals. Formed landing gear, all hardware. Step by step instructions. Price: $2.95.



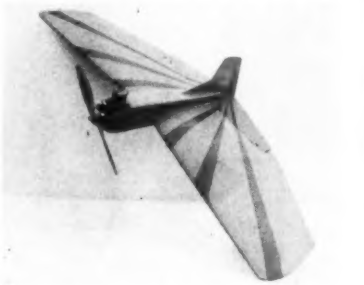
▸ *Scientific Torpedo:* For boat fans, a hot Half-A powered outboard for either Allyn or Atwood types. Also takes electric outboards, battery operated. Length over-all is 20 in. Kit manufactured by Scientific Model Airplane Co. (113 Monroe St., Newark 5, N. J.) Retail price is $2.95.

▸ *Super Cadet:* Free flight scale fans with an eye on contest events will find this scale kit good performer. Designed by Henry Struck and past Nationals winner. Detailed plans, prefabricated. Converts to other flying methods. By Berkeley Model Supplies (West Hempstead, N. Y.) $2.95.

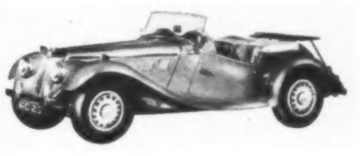
▸ *Mambo:* Cute 48 in. wingspan radio control kit by Sterling Models (Philadelphia, Pa.) intended for .09 to .19 engines, snappy enough for anybody! Die-cut or shaped balsa and plywood parts. All hardware, formed landing gear, step-by-step plans with full details on radio installation. Has lifting type stabilizer. Good beginner item on .09's. Price is $5.95.



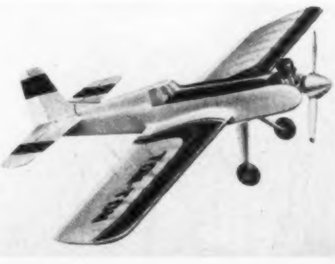
▸ *DMECO Sport Wing:* With current trend to wings and other fuselageless jobs in the combat event, deBolt Model Engineering Co.'s (Williamsville, N. Y.) Sport Wing for .19, .29, etc. makes good building project. Kit prefabricated. Swept forward wing planform, trailing edge flippers prove stable and maneuverable. Shown with O & R .23 engine, sells at $3.95.



▸ *British MG:* For sport car fans, well detailed kit by Berkeley Model Supplies (West Hempstead, N. Y.). Cast metal bumpers, grill, lights, stamped metal hub caps. Rubber wheels, full width axles, plastic upholstery. Carved, hollowed balsa body. Detailed full size plans and authentic decals. Step-by-step instructions. Latest in MG car series kit sells for $1.50.



▸ *Tom Tom:* A 40 in. U-control model for sport or stunt, by Henry Engineering Co. (Burbank, Calif.) for engines of .19 to .35 cu. in. displacement. Is one of firm's line of stunt designs. Two-sided fuselage, built-up wing. Fully prefabricated, detailed plans, instructions. Price: $3.95.



▸ *Aquamite:* Made of high-impact plastic, this twin-ruddered inboard measures 13 in. over-all and weighs 11-1/2 oz. Manufactured by the Wen-Mac Corp. (2240 Centinela Ave., Los Angeles 64, Calif.), this racing boat is powered by the Wen-Mac .049 with flywheel. List is $9.95.

▸ *Secret Weapon:* Staff-tested, this A-B engined profile makes ideal trainer, easily assembled. Shaped wings, profile cut fuselage, die-cut tail surfaces, interlocking assembly. Span, 24 in. Designed by Walter Musciano, Scientific Model Airplane Co. (113 Monroe St., Newark 5, N. J.), $1.95.

SPITFIRE PRODUCTS' . . . NEW .049

COMPLETE WITH PROPELLER GLOW PLUG CLIP AND WRENCH

$4^{95}

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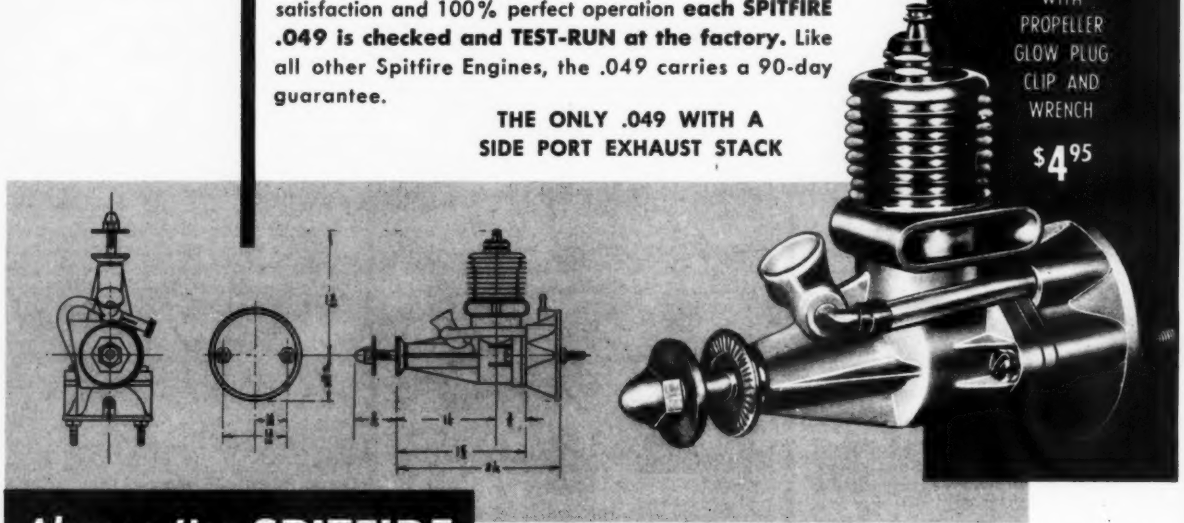

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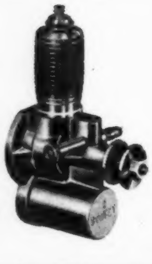

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Quick, positive starts. Snap on or off easily.
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. . . the greatest advance ever made in glow plug history! The engineering changes of the internal parts of this new plug, along with a new method of winding and a recently developed alloy in the platinum element, has evolved into a plug with a life up to three times longer than the former outstanding Spitfire Glow Plug. The new plug is slightly shorter, for better appearance, and is recognized by the satin-gold iridite* finish.

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Designed and engineered by Lew Mahieu

*This is the same finish as required by the Navy for the best protective plating of steel.

See your local model and hobby shops.

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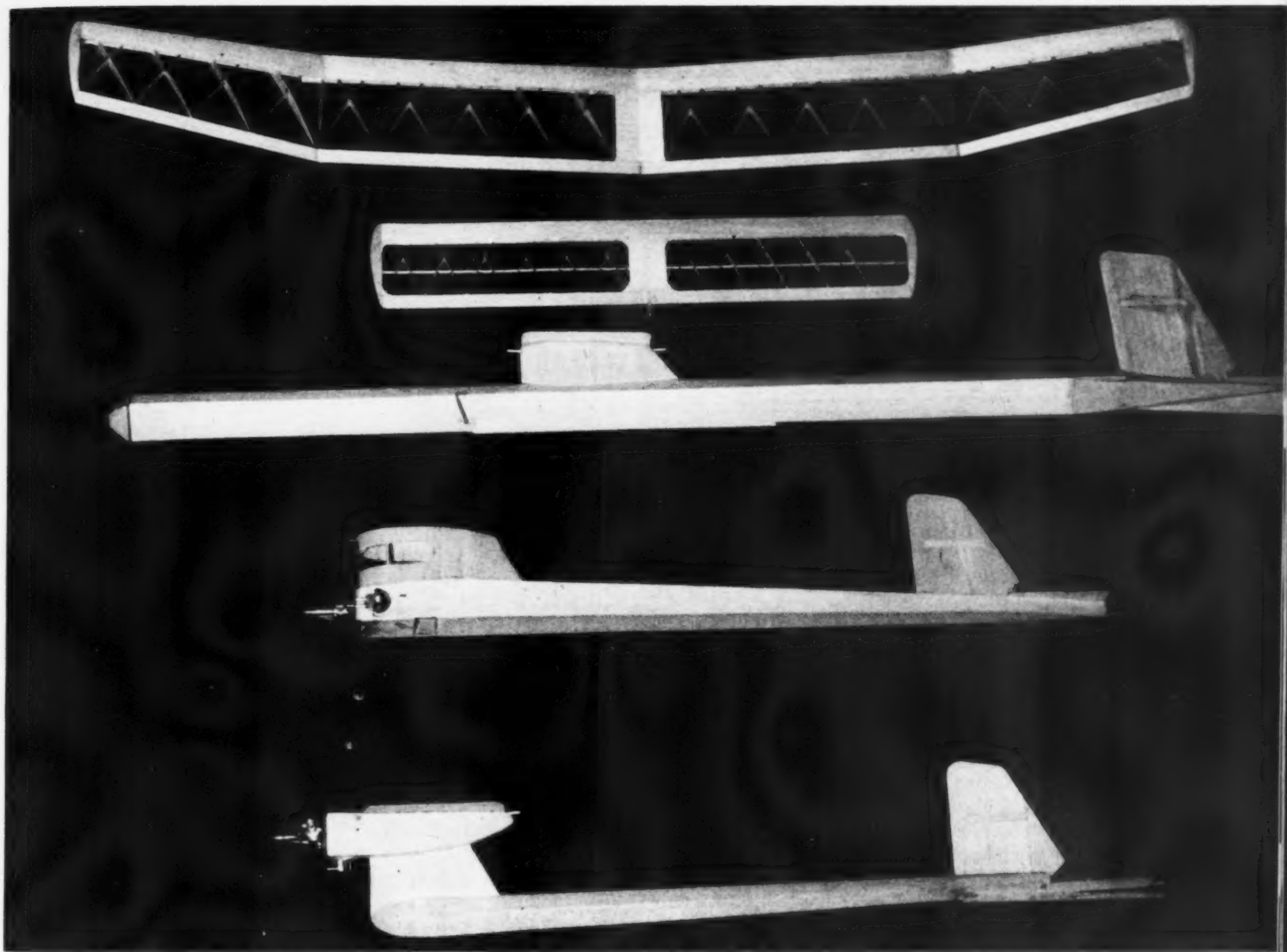


Wing and stab interchangeable for three fuselages, top to bottom: Wakefield, PAA-Load, free flight. Geodetic construction stops those pesky warps.

TRIPLE THREAT

Contest-goers will cheer this great, three-in-one airplane. Duration as a Wakefield, PAA-Load or free flight, is right up there. Take our word, it's no freak, for the designer knows what he is doing.

By LEE RENAUD

The modern high-thrust line job VTO's with the greatest of ease, so it has to be good. Construction, all three versions, is straightforward.

▸ Triple threat is my answer to the biggest problem that faces most model builders: time. The basic model is the Wakefield, with the same wing and stab for the gas models. This simplifies packing and transportation problems, and also cuts building time. All models conform to the AMA contest rules for 1955 and 1956.

Design is fairly conventional, with minor changes from my 1954 designs. Five years of contest flying have taught me that the most important feature of any model is consistency. I feel that any aerodynamic feature that detracts from this is not worth while. Efficiency comes at the expense of stability; thus, the ultimate design will be quite tricky to fly. The value of streaming has yet to be proven at model Reynolds Numbers, and it makes for difficulty in building and repair. I think that clean functional lines, with careful alinement of all surfaces, are more than adequate for contest models. Good stable mounting platforms are more important than a slight reduction in frontal area.

Aerodynamic features are the long tail moment arms, which improve stability and glide performance. Wing

Packing in the turns matter of factly, the author makes use of hefty, reliable winder. If you hope to fly rubber seriously, prepare good winder.

Reversed prop reveals jaunty PAA-Load version was undergoing a test when this picture was made. Rely on colored tissues, not dope, to pretty up.

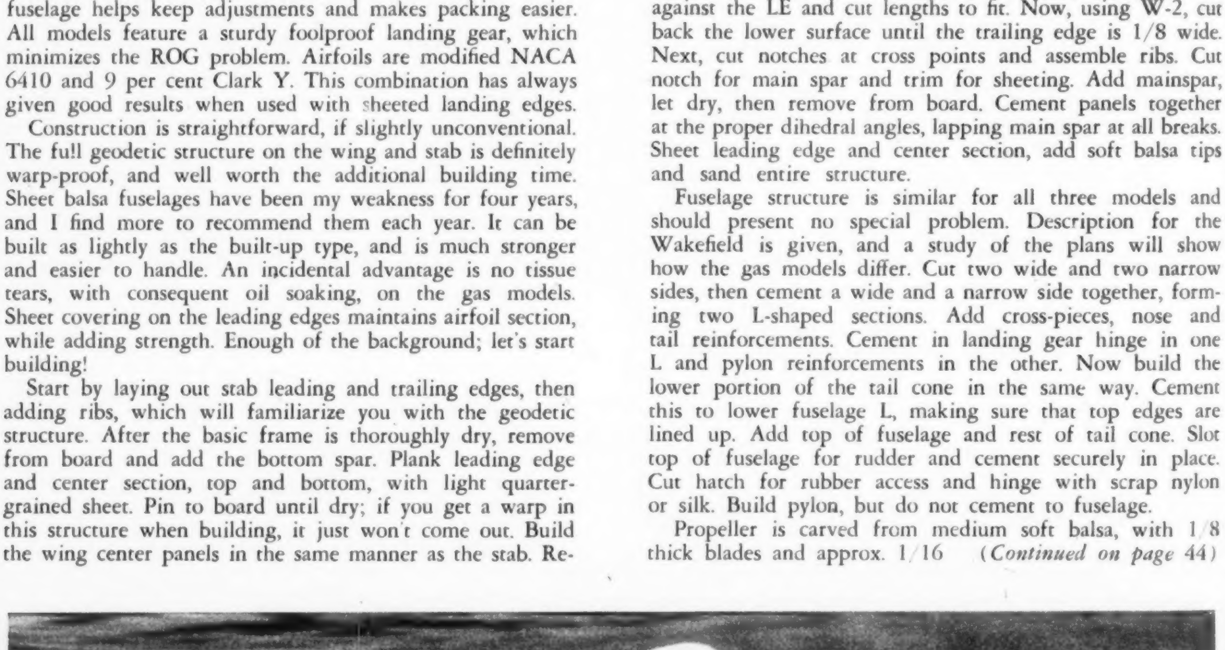
and stab are medium-high aspect ratio; the stab is 38 per cent of the wing area. The moderately high dihedral with a high wing location assures a good spiral stability. CG position is fairly far back, but with 2° incidence, longitudinal stability is adequate. Fixing the fin permanently to the fuselage helps keep adjustments and makes packing easier. All models feature a sturdy foolproof landing gear, which minimizes the ROG problem. Airfoils are modified NACA 6410 and 9 per cent Clark Y. This combination has always given good results when used with sheeted landing edges.

Construction is straightforward, if slightly unconventional. The full geodetic structure on the wing and stab is definitely warp-proof, and well worth the additional building time. Sheet balsa fuselages have been my weakness for four years, and I find more to recommend them each year. It can be built as lightly as the built-up type, and is much stronger and easier to handle. An incidental advantage is no tissue tears, with consequent oil soaking, on the gas models. Sheet covering on the leading edges maintains airfoil section, while adding strength. Enough of the background; let's start building!

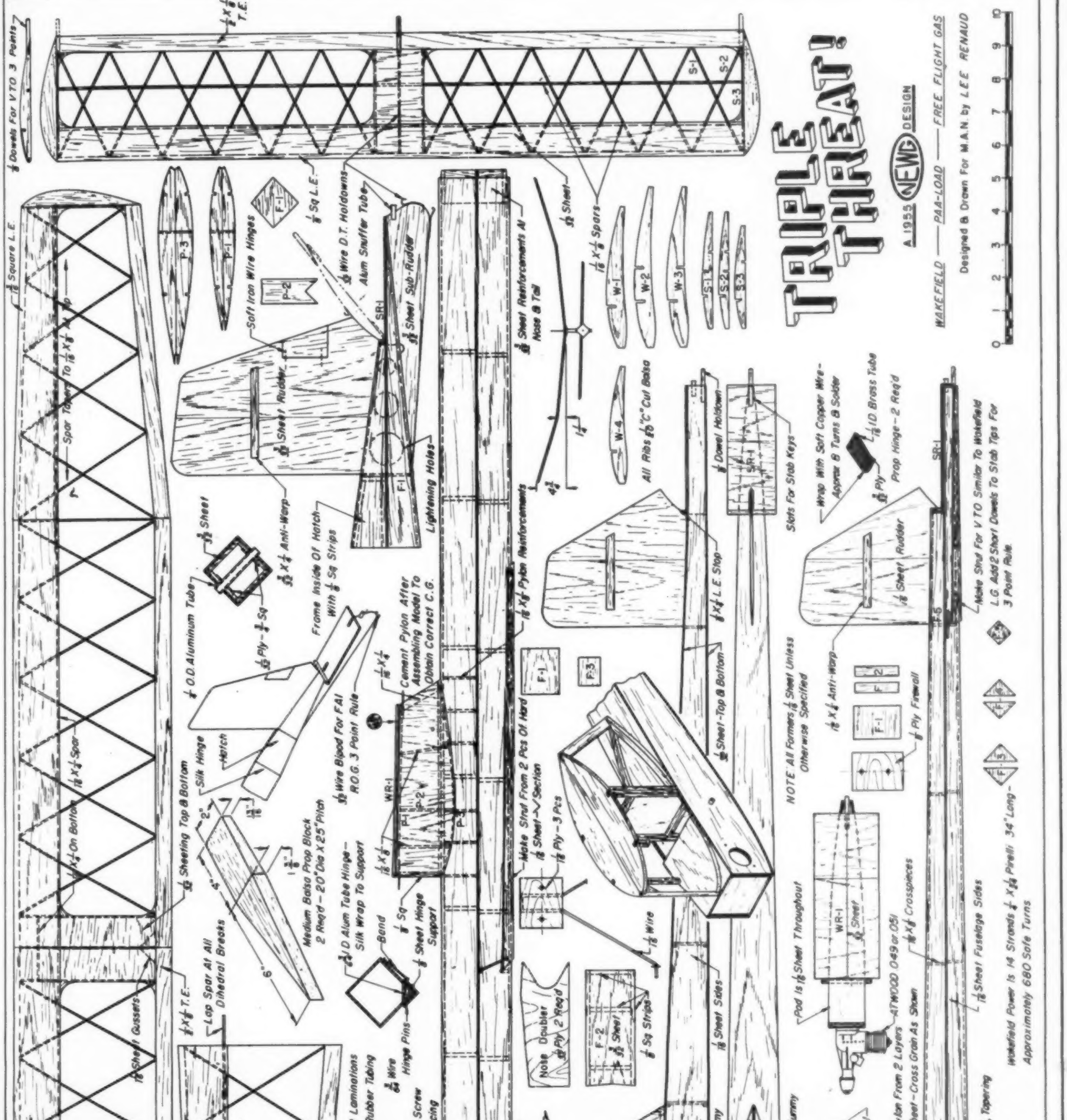
Start by laying out stab leading and trailing edges, then adding ribs, which will familiarize you with the geodetic structure. After the basic frame is thoroughly dry, remove from board and add the bottom spar. Plank leading edge and center section, top and bottom, with light quarter-grained sheet. Pin to board until dry; if you get a warp in this structure when building, it just won't come out. Build the wing center panels in the same manner as the stab. Remember to block up leading and trailing edges with scrap 1/16 sheet. The tip panels require a little more work because of the taper. Pin down leading and trailing edge, then cut out 20 ribs using template W-2. Do not notch these ribs, or cut back for leading edge sheeting. Butt each rib against the LE and cut lengths to fit. Now, using W-2, cut back the lower surface until the trailing edge is 1/8 wide. Next, cut notches at cross points and assemble ribs. Cut notch for main spar and trim for sheeting. Add mainspar, let dry, then remove from board. Cement panels together at the proper dihedral angles, lapping main spar at all breaks. Sheet leading edge and center section, add soft balsa tips and sand entire structure.

Fuselage structure is similar for all three models and should present no special problem. Description for the Wakefield is given, and a study of the plans will show how the gas models differ. Cut two wide and two narrow sides, then cement a wide and a narrow side together, forming two L-shaped sections. Add cross-pieces, nose and tail reinforcements. Cement in landing gear hinge in one L and pylon reinforcements in the other. Now build the lower portion of the tail cone in the same way. Cement this to lower fuselage L, making sure that top edges are lined up. Add top of fuselage and rest of tail cone. Slot top of fuselage for rudder and cement securely in place. Cut hatch for rubber access and hinge with scrap nylon or silk. Build pylon, but do not cement to fuselage.

Propeller is carved from medium soft balsa, with 1/8 thick blades and approx. 1/16 (*Continued on page 44*)



Folded prop and long fuselage make the gliding Wakefield look like a graceful marsh bird in flight. All three models meet the 1955-56 rulings.



FULL SIZE PLANS AVAILABLE. SEE PAGE 50.

1. For wrinkle-free covering job, the framework must be sandpapered absolutely smooth. Tack sandpaper to large, flat block, as shown.

2. Preliminary coat of dope insures better covering job, helps covering to stick, prevents dampness from bending sheet wood trailing edges.

HOW to COVER with silk...a MAN how-to-do-it

By P. G. F. CHINN

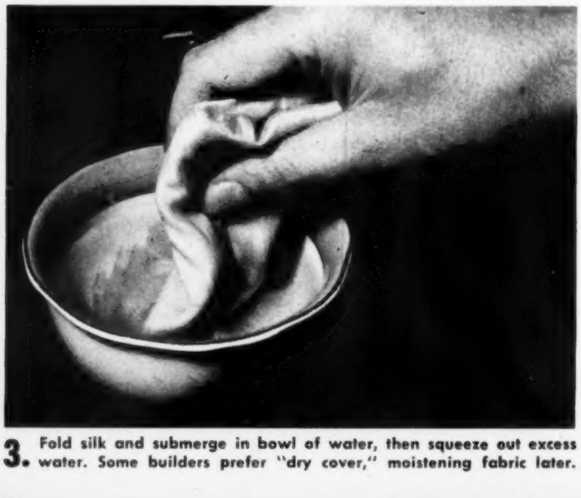
Built-to-last stunt models, radio control planes, even that sport job, should be covered with silk. And with silk at the five-and-dime, cost not bad.

▶ The use of silk as a covering material dates back to the earliest days of modeling. The coming of balsa construction and ultra-lightweight models, particularly the popular rubber jobs of the 1930's, were responsible for the emphasis shifting to tissue covering and, more recently, nylon has come into the picture, mainly for RC models.

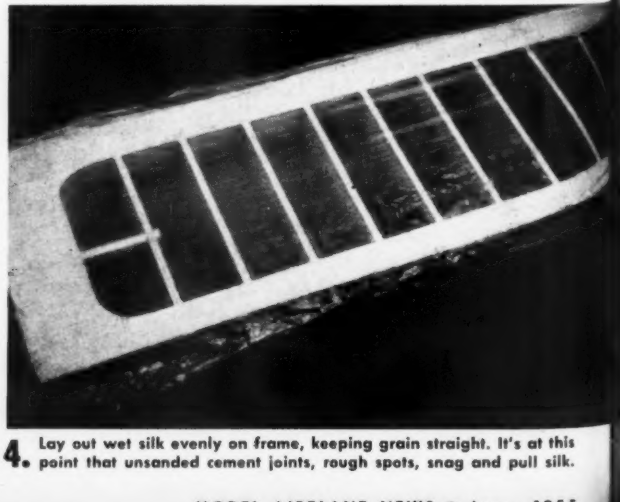
Lightweight Japanese silk, however, still has plenty of uses; in fact, we would say that few modelers realize the true worth of silk. Many models which are covered with paper could better use silk and even contest types are not entirely excluded from this. For stunt, sport and scale controlline, silk is excellent.

The average builder seems to dismiss the thought of silk covering in the following terms: "Too heavy; soaks up too much dope; too difficult to apply..." Now this is not right at all. Lightweight silk, suitable for models, need weigh only 1/3 to 1/2 oz. per sq. yd.; i.e., even less than some of the gas model paper type covering materials. Again, silk, though needing more dope than, for example, Silkspan paper, does not soak up as much as some of the heavier grades of gas model tissues. As for being difficult to apply, we can only suggest that you try silk, using the methods described here. We think that you will find it easier to make a good covering job with silk and also quicker, for one does not have to worry too much about compound curves: silk can be pulled around a curved wing tip where paper would require a separate piece to be fitted. It is even possible (though not necessarily recommended) to cover over dihedral breaks on the *top* surface of a wing and we have actually seen the entire top surface of a Super-Brigadier polyhedral wing covered with *one* piece only.

We mentioned contest models. We were thinking, in particular, of FAI gas and Nordic A.2. A 2.5 cc (.15 cu. in.) powered free flight needs to weigh 17.65 oz., to make the FAI loading of 7.06 oz. per cubic centimeter displacement, and the best size model for this weight is around 550-600 sq. in. *total* area (i.e., wing and stab.) or, say, 400-450 sq. in. wing area maximum. Using standard construction and a motor weight of around 4-5 oz., it is not difficult to keep below this weight for such a model size and there is certainly a case for using a silk covered wing to increase durability and reduce risk of punctures. (*Continued on page* 48)



3. Fold silk and submerge in bowl of water, then squeeze out excess water. Some builders prefer "dry cover," moistening fabric later.



4. Lay out wet silk evenly on frame, keeping grain straight. It's at this point that unsanded cement joints, rough spots, snag and pull silk.

5. Pull silk spanwise first, then across the width or chord of wing, as shown. Dope the silk to perimeter of surface. Moisture doesn't matter.

6. Before trimming left-over silk, seal edges with dope, allow to dry. Doing this, you can trim quickly, neatly, and avoid pulled edges.

7. Always use a keen—no nicks, Buster—blade for neat trimming. Be careful, too, that you don't dig into thin wood edges with razor.

8. When covering double curvatures, as in this wing tip, the wet silk will pull taut in both directions, something you can't do with paper!

9. Leading edges usually are trimmed to leave slight overlap, so that wood not exposed (shows when colored). Trailing edges trim flush.

10. Final check is made by sealing all edges with dope. In this case, dope to attach covering not be applied to sheet, but near to edge.

11. On flying surfaces dope underside first. Model shop dope usually thin, but regular aircraft dope thinned, maybe 25%, for brushing.

12. Pin down surface on wood slivers, so won't stick; prevents warping. Silk takes three to six coats to fill. You can't rush silking job.

The Veto

Good throttle control is essential to "wrong way" landings. This job has one. Other than that, the key lies in the prop. Pitch governs descent.

Full-fledged stunter that not only VTO's, but can land tail-first—if you're a sharp pilot. The designer gives a frank, but not bad, VTO appraisal.

Non-experimental minded stunt fans who like the sweepback look can leave off the bottom fin, install landing gear and have new look stunter.

By ALLYN M. ALDRICH

▶ The idea of an airplane that can take off vertically and land vertically is not new by any means. From almost the beginning of man's conquest of air, he has wanted an airplane that will use the smallest possible space for taking off and landing without giving up performance.

The first really practical application of this was the helicopter, a ship that could go straight up and straight down. The helicopter was a step forward in aviation, but for its new quality it had to give up speed and payload.

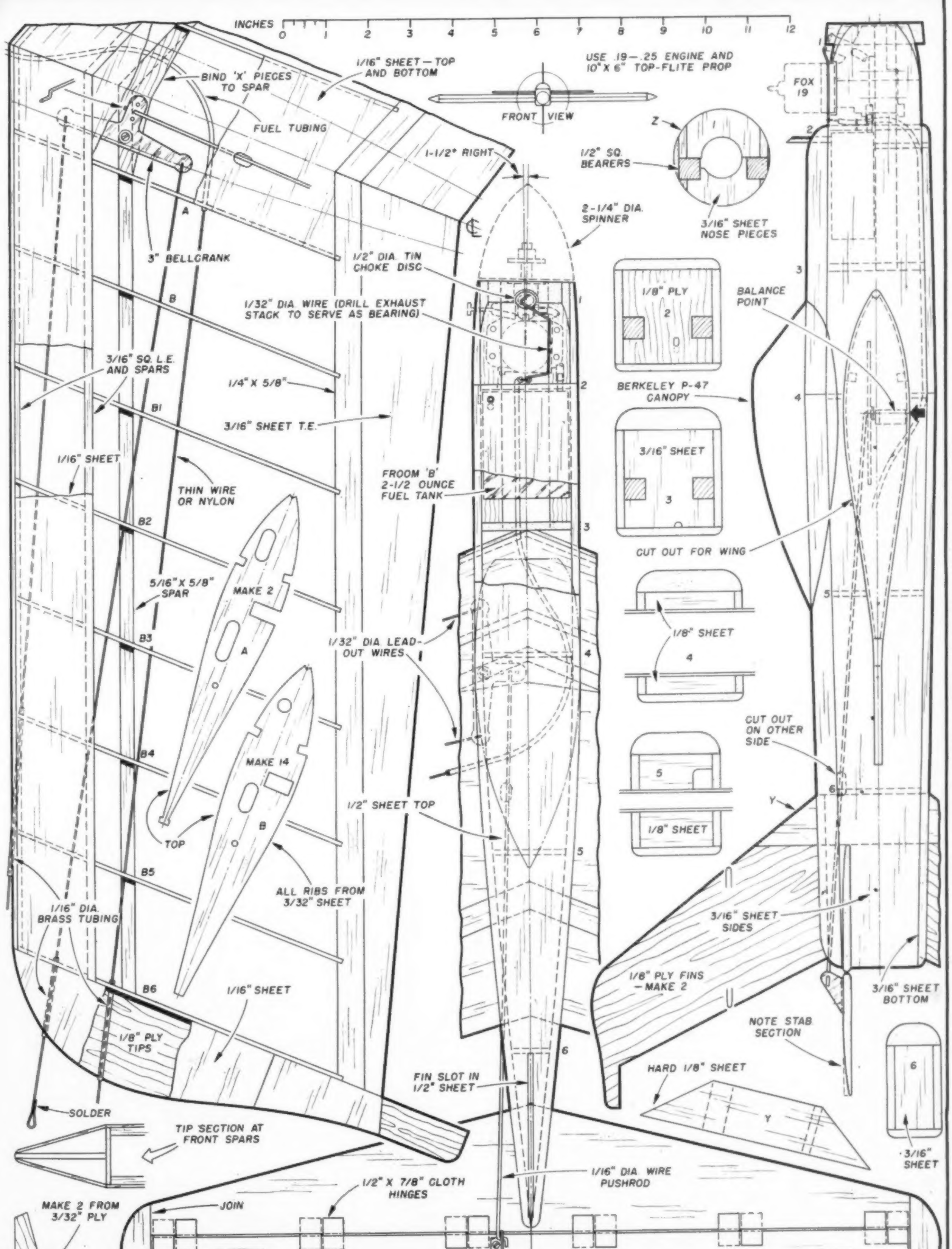
Just recently, two aircraft corporations have come out with vertical take-off airplanes that use turbo-props with counter-rotating propellers. These two ships are fast fighters that can be carried on almost any naval ship of destroyer class or larger. They can be used for protection and observation, and they increase the distance for which a ship is effective.

In September of 1954, I was flying an original airplane, Fox .25, and an 11-6 Top Flite prop. The engine was running rich, and I decided to see if I could stall it out. To my surprise the ship went into a stall, and started to descend almost vertically with surprising response to the controls. After having flown this airplane several times, I decided to build one for vertical take-off and landing. The model that I built would have a two-speed engine: high speed for take-off and stunt and a low speed for landing. I tried three different engine controls, two spring-loaded ones and one single-action one; with the spring-loaded ones, I had to keep a constant pressure on the third line to keep it closed, but with the single-action one, I only had to pull it at the end of the flight and it would stay closed.

The engine control is a venturi choke. The venturi choke consists of a U-shaped piece of wire with a metal disc on one end. This wire runs through the exhaust stack and uses it as a bearing. The engine controlline should be about 5 ft. longer than the controllines and hooked to the flier's belt to leave him him free to concentrate on launching the airplane, which is a difficult task in itself.

I suggest that, the first time you take the ship off, you give a slight bit of down so that it will take off on about a 75° angle until you get the feel (*Continued on page* 52)

Taking a cue from the great inventors who found out things by accident, Aldrich found standard stunter could be backed down—and now look!



FULL SIZE PLANS AVAILABLE. SEE PAGE 50.

First place winner in Jr.-Sr. division, John Elles, cranks up his Cessna Bird Dog powered by Cox Space Bug. Unfancy field box functional item.

Supermarine Sparrow, an English oldie, earned Hal Cover tops in scale points, Jr.-Sr., but high wind held him to third. Powered by an .049 Cub.

AIR WAYS AT A SCALE CONTEST

Fudo Takagi's fine pictures of Convair Aeromodelers' 2nd Annual Scale Contest show exciting new crop of models on the Coast.

Trying to knock down a wing tip on erratic take-off in 25 mph wind is Dick Sladek. His Mac .049 Diesel-powered Robin recovered beautifully.

Two dummy cylinders added to Mac Diesel give Dick Baxter's excellent Longster most realistic appearance. Neat trim distinguishes good ship.

Young Johnny Hill, pop Ray looking on, gives highly professional start to Piper Supercruiser. Powered by Wasp .049, plane took Jr.-Sr. second.

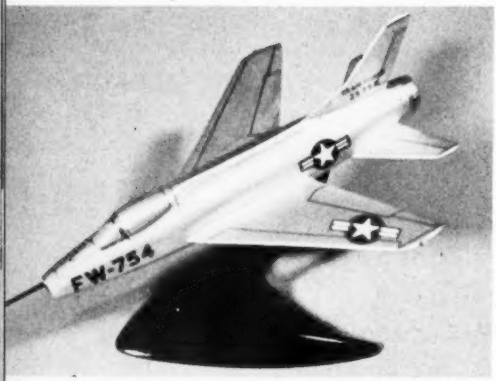
Fast take-off by Lou Culler's Buhl Bull Pup wasn't enough to repeat his first place win of last year. Mac Diesel-powered, Pup is U.S. ancient.

Putt, putt, putt! Walt Mooney's Aeronca Champion top flier, but long runs on an Allbon Merlin .046 Diesel chopped him to second on ratio system.

Smile of relief on Bob Moncrieff's face as his Thermal Hopper-powered T-Craft lifts off, plus that "body English" steals a scene from the model.

Winning flight, Bob Hill. Says Takagi, "That Supercruiser is extremely fast, climbs like a fiend." Modified Berkeley kits, Piper good subject.

SOLID SABRE



A carving, sanding, painting project like this will start you on the way to being a modeler.

Plastic models are slick but you can brag "I made this myself" after completing this Super Sabre.

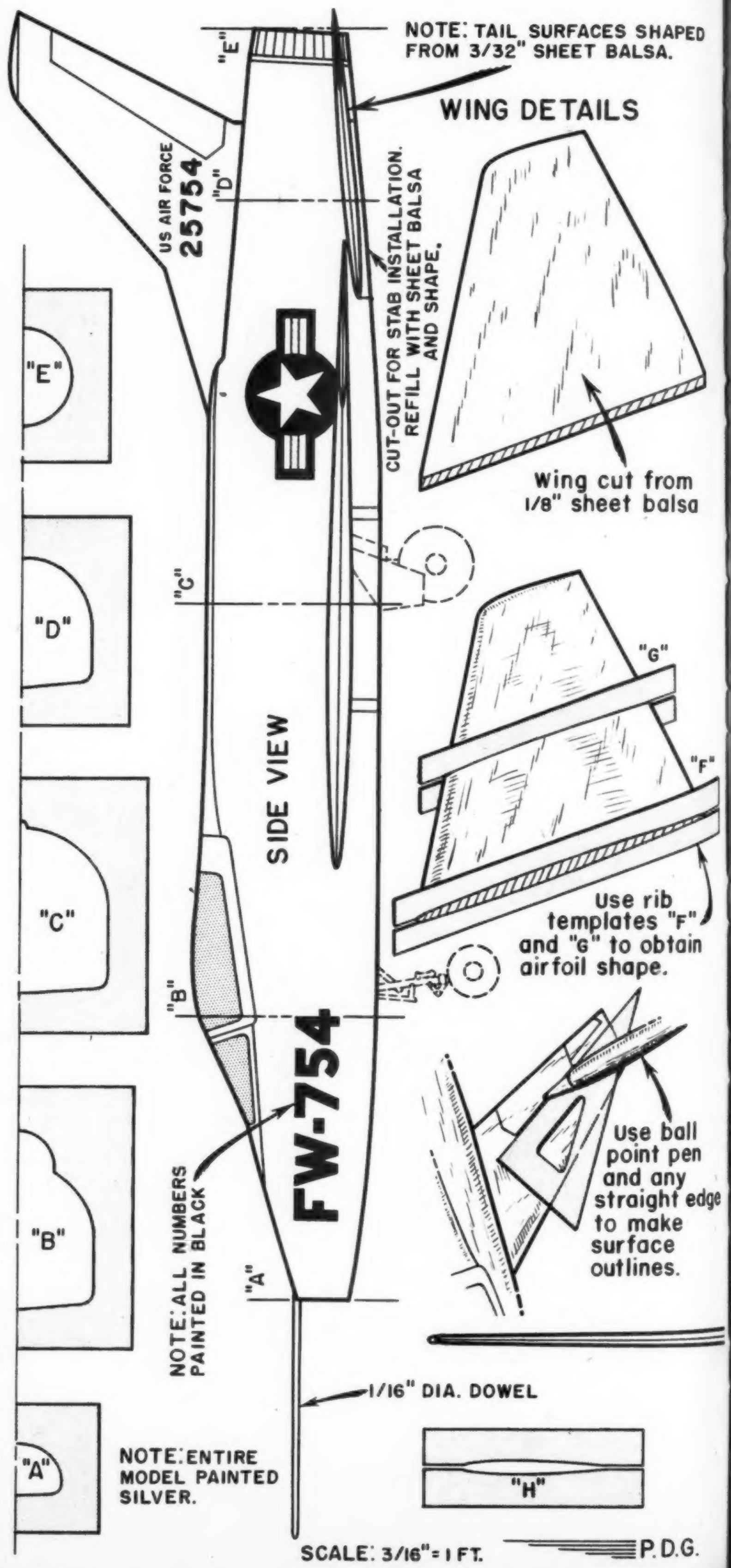
by PAUL E. DEL GATTO

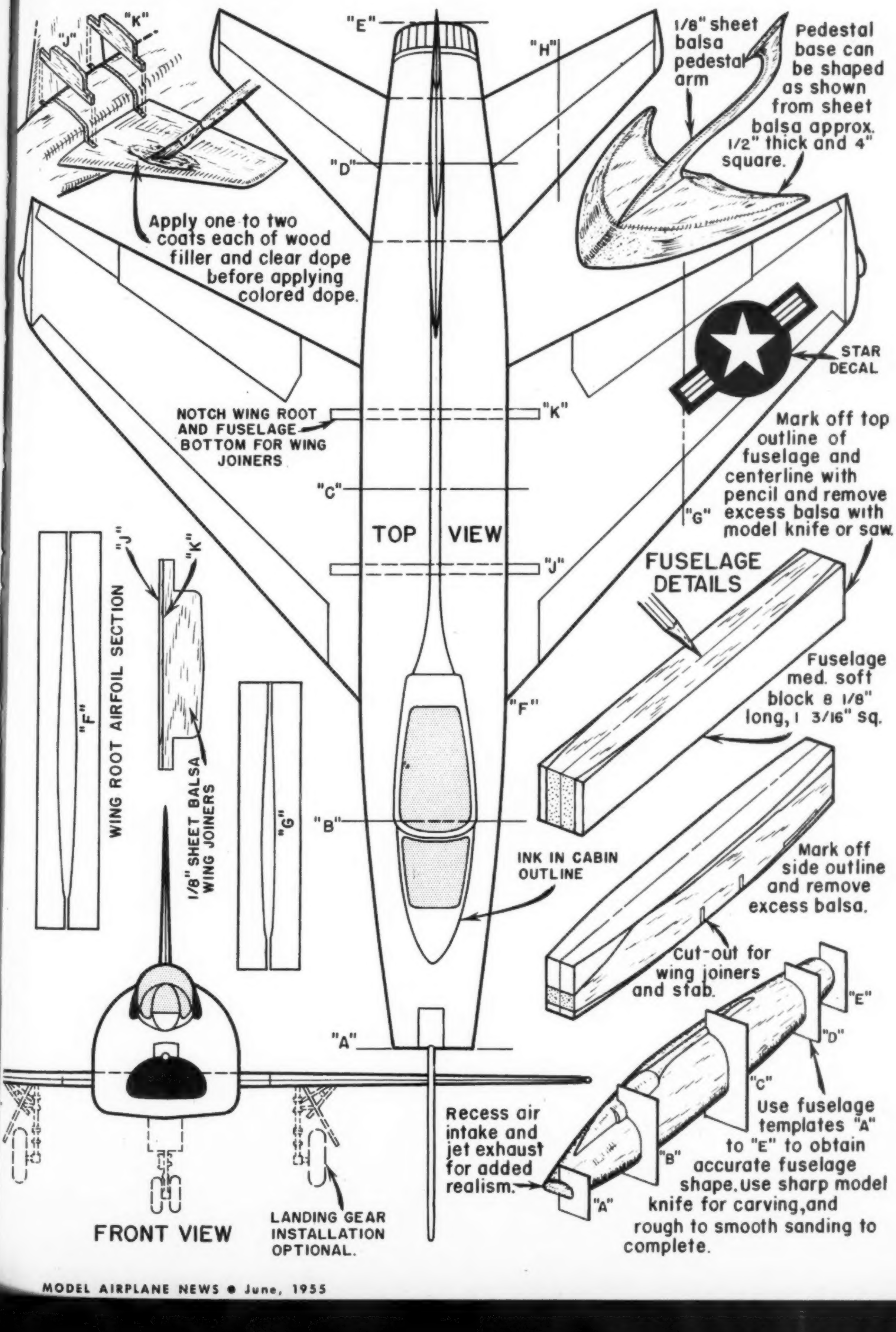
▶ Plastic models are okay for the rank beginner or for making up a quick collection of display models just for looks, but once you have been initiated into the hobby, you like to get that "build it yourself" feeling and not just the "glue it together" routine. There's a lot to be said for carving out solid models, because they are easy, fun to pattern, and touch on the most important phases of general model construction technique.

This little Super Sabre, complete with stand and colored dope finish, represents two to three evenings of building fun. When you view it completed, you'll know that wonderful feeling of creative achievement. "Look what I built," you can say, and really mean it. A little rough next to a plastic model, maybe — but, gosh, *you* made it. All of it.

The Super Sabre is particularly easy to pattern because of its flat sides, where the wing and tail surfaces join the fuselage, and the thin wing and tail surfaces simplify the shaping. Large fillets and complicated curves are also noticeably absent. Just follow the plans.

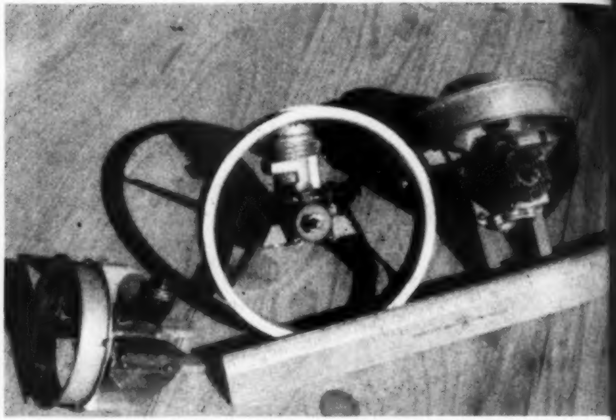
For originality, create a stand for the model from your own imagination. In applying a colored dope finish to the model, remember first to apply one to two coats of sanding sealer and then one to two coats of clear dope, sanding down gently between each coat. Then apply several coats of colored dope, use decals, or reproduce as much of the markings as you can. END




"E"
"H"
"J"
"K"
1/8" sheet balsa pedestal arm
Pedestal base can be shaped as shown from sheet balsa approx. 1/2" thick and 4" square.
"D"
Apply one to two coats each of wood filler and clear dope before applying colored dope.
STAR DECAL
NOTCH WING ROOT AND FUSELAGE BOTTOM FOR WING JOINERS
"K"
Mark off top outline of fuselage and centerline with pencil and remove excess balsa with model knife or saw.
"C"
"G"
TOP VIEW
"J"
FUSELAGE DETAILS
"J"
"K"
WING ROOT AIRFOIL SECTION
"F"
"F"
Fuselage med. soft block 8 1/8" long, 1 3/16" sq.
1/8" SHEET BALSA WING JOINERS
"G"
"B"
INK IN CABIN OUTLINE
Mark off side outline and remove excess balsa.
Cut-out for wing joiners and stab.
"E"
"A"
"D"
"C"
Use fuselage templates "A" to "E" to obtain accurate fuselage shape. Use sharp model knife for carving, and rough to smooth sanding to complete.
Recess air intake and jet exhaust for added realism.
"B"
"A"
FRONT VIEW
LANDING GEAR INSTALLATION OPTIONAL.

...all about JETS

PART THREE


Three samples of "canned duct" powerplants. Fox .19 produced 26 ounces thrust on 4 in. fan. Juggle fuel and plug combos to control temperature.

by ROBERT T. DeVAULT

The ducted fan? What is it? How good is it? What governs its design? How to get the most out of it? Continuing the series of articles on reaction propulsion is this authoritative round-up on fan power.

Introduction

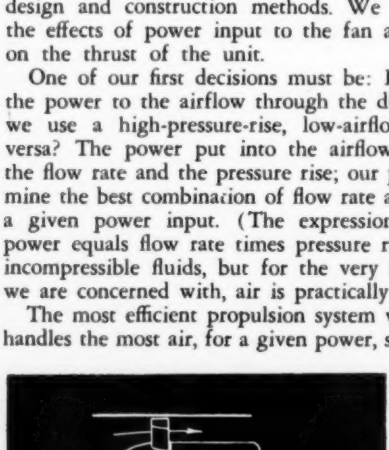
This is the third in a series of articles on model jet propulsion. The first two articles covered jet propulsion in general and compared model propeller performance to model jet engine performance. It was shown that the ducted fan engine could serve as a useful model engine to simulate full scale turbojets. Ducted fan design is not simple, however, so that this article is devoted to an explanation of ducted fan design principles. Careful study of the material given here will help to get your own model jet plane into the air.

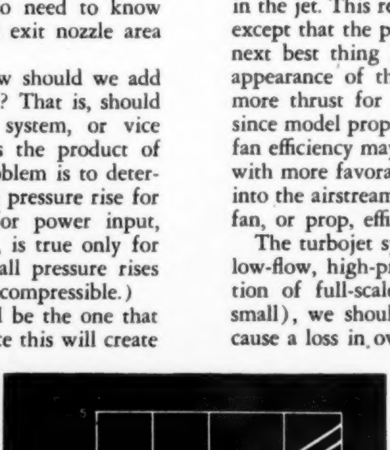
▶ The first thing to do, before getting into design details, is to estimate what it is possible to achieve, using reasonable design and construction methods. We also need to know the effects of power input to the fan and exit nozzle area on the thrust of the unit.

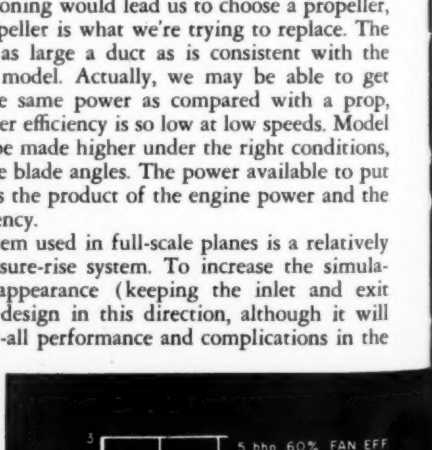
One of our first decisions must be: How should we add the power to the airflow through the duct? That is, should we use a high-pressure-rise, low-airflow system, or vice versa? The power put into the airflow is the product of the flow rate and the pressure rise; our problem is to determine the best combination of flow rate and pressure rise for a given power input. (The expression for power input, power equals flow rate times pressure rise, is true only for incompressible fluids, but for the very small pressure rises we are concerned with, air is practically incompressible.)

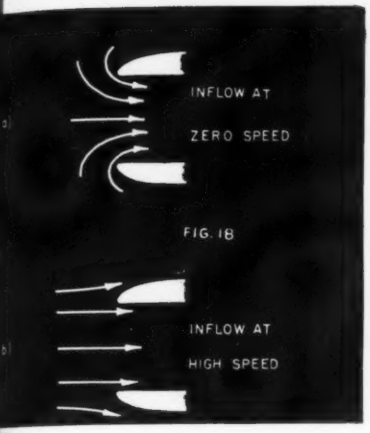
The most efficient propulsion system will be the one that handles the most air, for a given power, since this will create the lowest velocity jet and thereby minimize the energy lost in the jet. This reasoning would lead us to choose a propeller, except that the propeller is what we're trying to replace. The next best thing is as large a duct as is consistent with the appearance of the model. Actually, we may be able to get more thrust for the same power as compared with a prop, since model propeller efficiency is so low at low speeds. Model fan efficiency may be made higher under the right conditions, with more favorable blade angles. The power available to put into the airstream is the product of the engine power and the fan, or prop, efficiency.

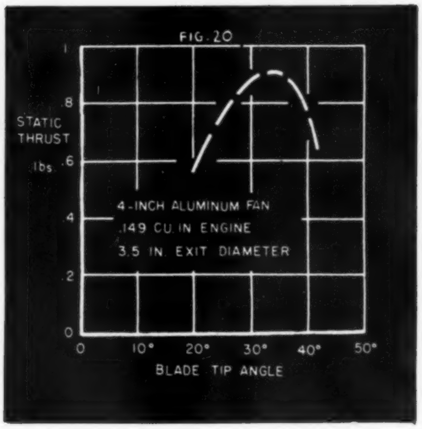
The turbojet system used in full-scale planes is a relatively low-flow, high-pressure-rise system. To increase the simulation of full-scale appearance (keeping the inlet and exit small), we should design in this direction, although it will cause a loss in over-all performance and complications in the

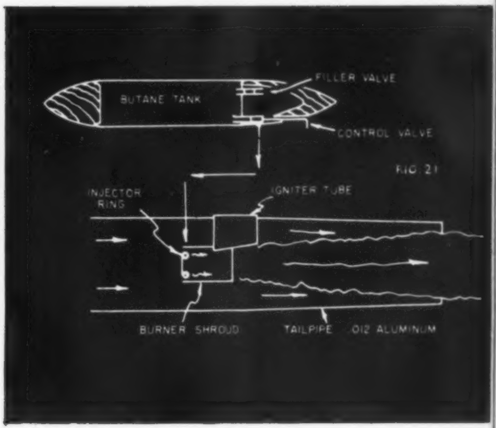












fan design. Fortunately, model piston engines produce so much power that we can afford to be a little wasteful and compromise the design in the direction of higher pressure rises and lower airflows.

Now we should consider some practical limitations on fan design. We have two basic types of fan, blower or compressor to choose from: 1. axial flow and 2. radial flow, or centrifugal. The two types are shown schematically in Figs. 15-A and 15-B. The pressure rise available from one set of axial flow blades is quite small; turbojets that use axial flow compressors have as many as 15 rotating and 17 stationary sets of blades with 20 or 30 blades in each set. It takes as many as 8 or 10 sets (stages) to get the same pressure rise that can be obtained with one radial flow, or centrifugal, impeller. The radial flow impellers take up a lot of frontal area, however, and so do not fit nicely into nacelles. Most of this area is taken up by the collector and ducts that take the air from the impeller slow it down and turn it back toward the burners and turbine. With the same over-all diameter limitation, we can get about twice the pressure rise from a centrifugal blower as from an axial blower of one stage.

Calculations based on the arguments above will lead to the choice of one-stage axial fan for most modeling purposes. The fan will probably have to be operated near its maximum pressure rise to keep the duct small, and make the system fit well into a model plane.

Fig. 16 presents the results of calculations to determine the thrust output of a ducted fan of reasonable efficiency (60 per cent) at static conditions, assuming no inlet or ducting losses. Curves for exit nozzle diameters of 2, 3 and 4 in. are shown. The plot uses logarithmic scales, so be careful when you read values from it. (If we had used linear scales, the straight lines would have become curves, which are harder to draw and less accurate.)

The importance of having the exit area as large as possible is very clear in this figure. You can get as much thrust from an .099 cu. in. engine as from a .149 cu. in. engine if you increase the exit diameter from 2 to 3 in. Note also that doubling the power with a fixed exit area does not double the thrust, but increases it only 67 per cent. Since these curves assume no duct losses, some judgment must be used in their application. Thus, when the exit diameter is as large as the fan diameter, the flow velocity past the engine will be high, and some losses will result and a lower thrust will be obtained.

The effect of flight speed on ducted fan performance has been calculated and is shown in Fig. 17. A curve for a constant fan efficiency is shown, as well as dashed lines indicating expected decreases in performance from off-design operation. Again, no duct losses were assumed.

Well, so much for general considerations. Now we have to get down to cases and go into some design details.

1. *Inlet Design:* Diagrams of the inlet flow for a typical ducted fan are given in Figs. 18-A and 18-B for static conditions and a high speed condition. Here we can see how the static and take-off thrust of a ducted fan can be severely compromised by a small inlet. The restriction of the flow at the inlet causes pressure losses in the flow and consequently, thrust losses. Turbojet powered planes have this same problem, and some are equipped with doors that open up for take-off and allow more airflow. As the flight speed increases, this throttling action loses importance, the streamlines straighten out and enter the inlet smoothly. This explains why some ducted fan modelers have noted a beneficial effect of speed on engine performance, which has been mistakenly assigned to "ram effect." Actually, the ram effect, the pressure rise following forward flight, is not favorable, as shown in Fig. 17. Calculations show that at speeds below 50 mph, the ram effect contributes nothing to engine efficiency.

If the inlet area is smaller than the fan area, the duct between the inlet and the fan will form a "diffuser." The function of this diffuser is to slow the air down and guide it to the fan, smoothly and with minimum pressure losses. This is usually a difficult job and requires that the inlet lips be well-rounded and that the angle between the duct walls be kept less than 12°, whether the duct cross-section is round, elliptical or rectangular. Any corners or obstructions to the flow will reduce the thrust forward.

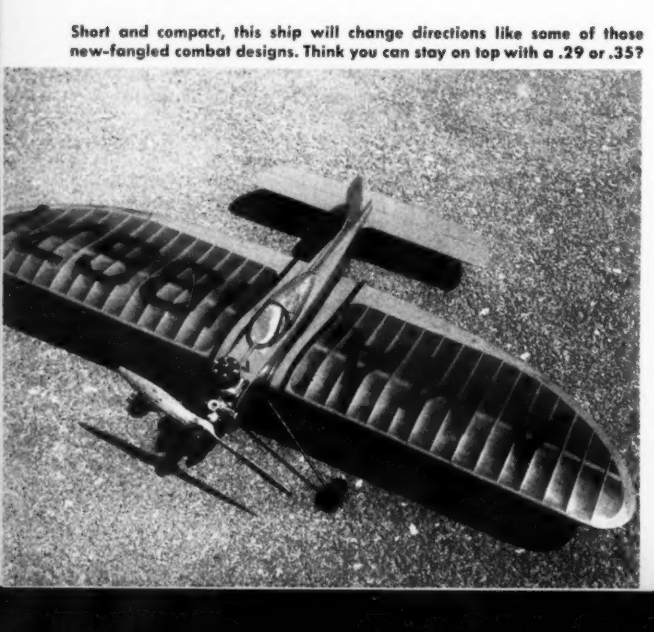
The ideal inlet for speed operation is a bellmouth, like the end of a trumpet. Such an inlet would have too much drag in flight, though, and would not look "scale." Actually, bellmouth inlets are used in ground testing of turbojets and the author has used them in his ducted fan development. Good results can be obtained with other inlets, however. One configuration tested used a circular diffuser with a 2.5 in. diameter inlet leading air to a 4-in. diameter fan. The inlet lips had a radius of about 1/4 in. The static thrust of this configuration showed no loss as compared with a bellmouth set-up. Inlets are sensitive to operation at angle of attack, also. Since they are generally called upon to work well only in level flight or nose-up attitudes, the lips can be raked back to compensate. The Ryan Firebee inlet is a good example of this.

2. *Fan Design:* Fan design is a whole science in itself, and we certainly cannot expect to cover it adequately here. We can present a few important design details, but we will have to limit the discussion to the type of fan which has received the most study by the author. This is an eight-bladed, axial flow type, with a hub diameter of one half the fan diameter (see photo). (*Continued on page* 43)

Distinctive looking little power house gives author reason to be pleased. Plans show external pushrod to help novice — it's internal in pix.

Leave out some ribs if you are lazy but it's agreed that the many ribs make special section accurate and add up to very beautiful looking wing.

Short and compact, this ship will change directions like some of those new-fangled combat designs. Think you can stay on top with a .29 or .35?



A-bomb

By BOBBY JONES

Designed expressly for the K & B .19, this ship is bit of a bomb. Class A-bomb, get it? With bigger engines and experienced pilot, it almost talks.

Although first developed for the K & B Torp .19, this design will carry any engine from an Ohlsson side-port to a Torp .35. This ship has won "firsts" in both stunt and speed, plus a "third" in a Class A speed event!

Eyebrows will probably be raised at the unorthodox airfoil (we call it the Polywog 19), but the model is extremely maneuverable and flies about 80 mph. A simpler square-winged version may be built by using the largest size ribs (1 and 2) only and the performance will still be almost as good.

Construction is simple. Points not covered here will be clear after a study of the notes on the plan. Incidentally, for economy, the majority of the 1/8 in. sheet parts are arranged on a standard 2 in. wide by 36 in. panel (on the full size plan) so that they can be transferred directly to the balsa without sorting them out.

Cut bearers to length, drill for the engine you use. Bolt engine in place (no offset). Cement two 1/8 in. ply (F1) formers to bearers, install fuel tank so that it fits tightly against rear of the front F1 piece. Clamp this assembly in a vise (use Weldwood, Ambroid or any *slowly*-drying cement) and leave until dry.

Cement two side panels to motor mount assembly, clamp in vise until dry. Cut out all ribs and taper spar as shown (note hole for pushrod). Insert spar in slots cut in fuselage sides and before cement sets. Check that it is at right angles to the sides.

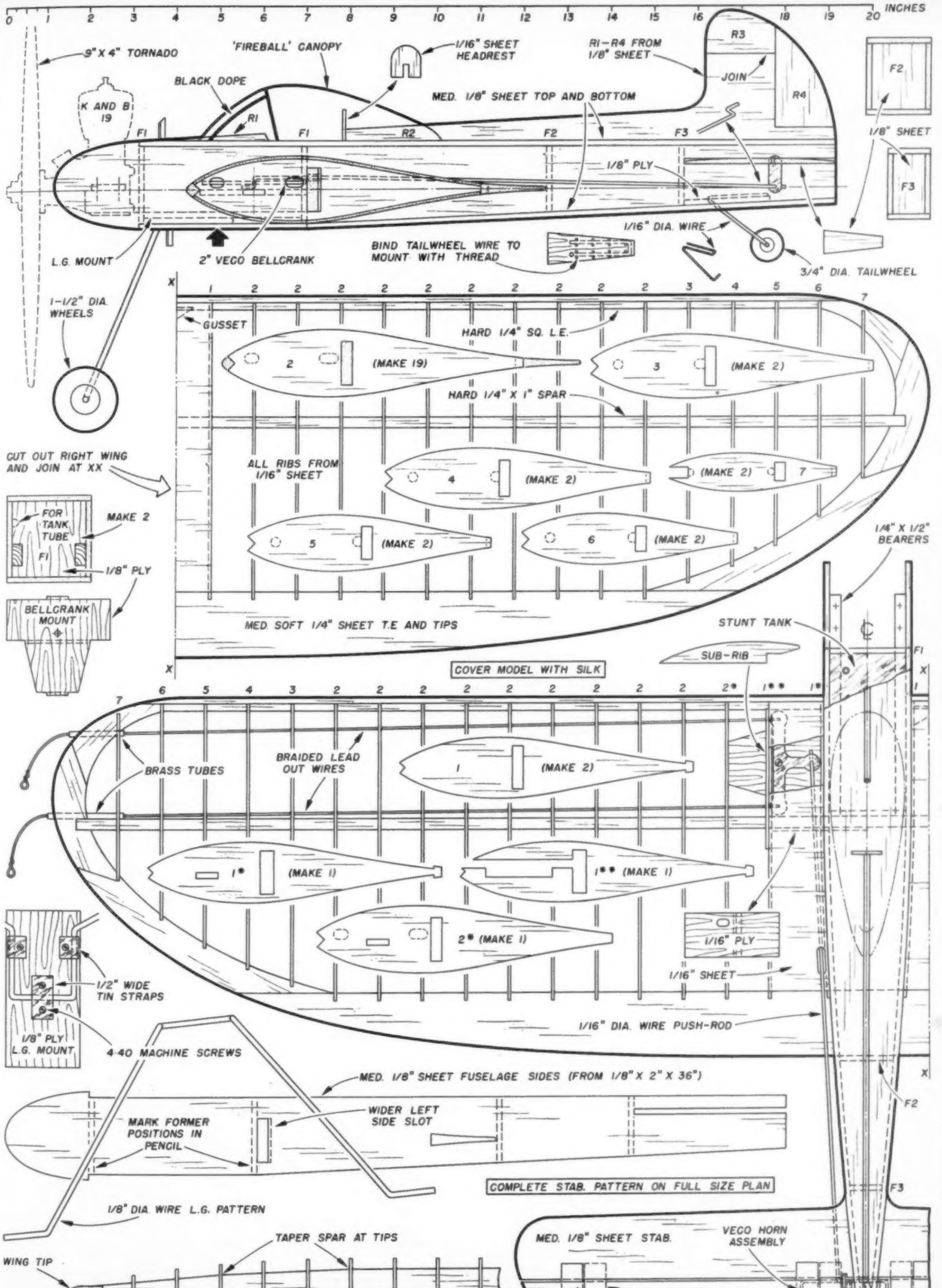
Pull in fuselage sides at tail, insert remaining formers (F2 and F3). Cover in fuselage top with 1/8 in. sheet, trim away the surplus. Slide root ribs on spar, cement them to sides. Follow with rest of ribs, leading edge, trailing edge and tips. Lead-out holes (shown dotted on patterns) are cut in *left* wing panel ribs only. Ply bellcrank mount and spar brace are installed at the same time as ribs No. 1* and No. 1** are cemented in place.

Insert pushrod through hole in spar, bolt bellcrank in place before sheeting top and bottom of space between the first pairs of ribs on both sides of the fuselage. Cement stabilizer in place, aline with wing in top and front views, then attach elevators with tape (note Veco horn assembly). Bend the rear end of pushrod and insert in the elevator horn.

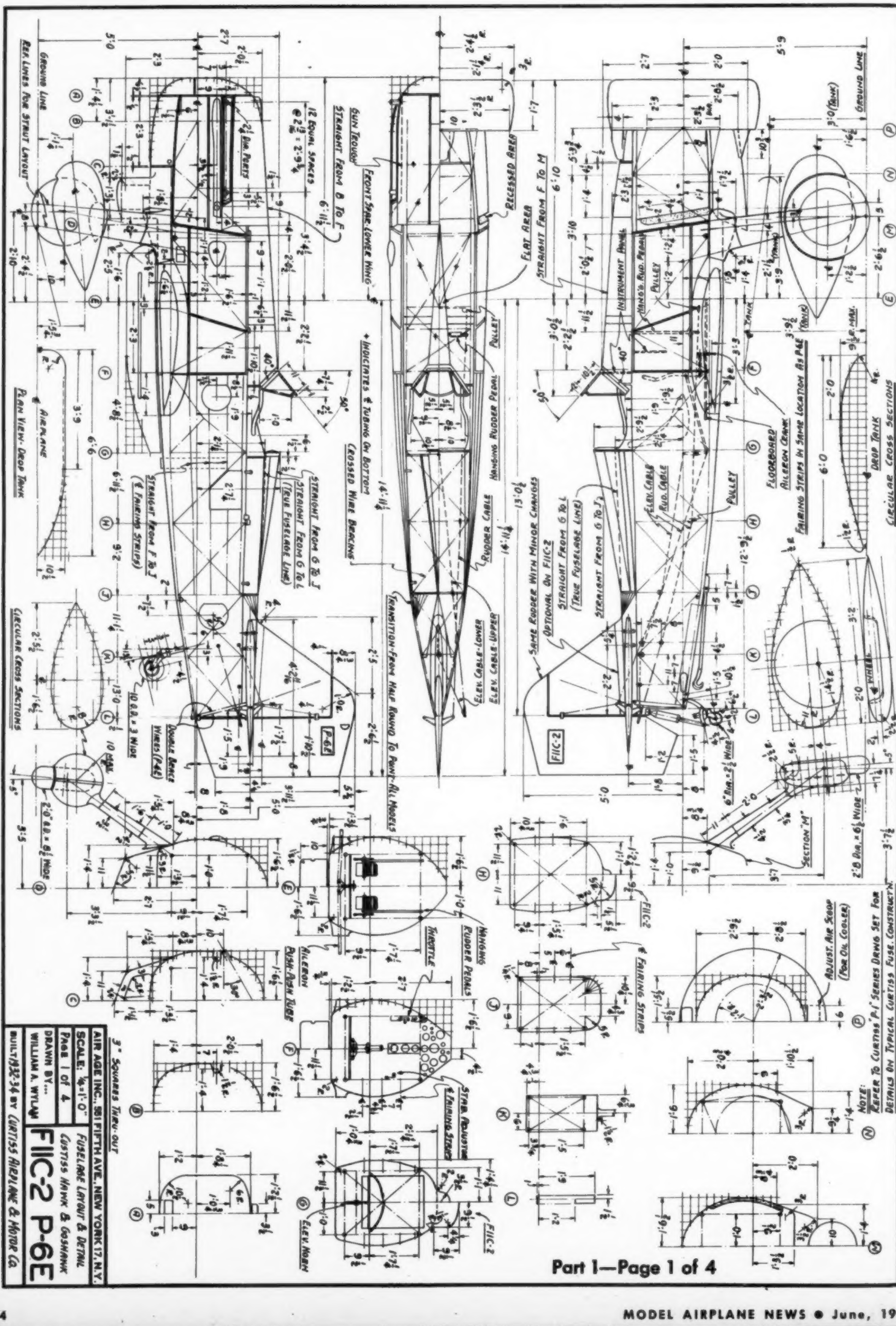
Next, join the R2 and R3 fin pieces, cement to fuselage, then add R1 and R4, offsetting R4 a half inch, as shown, and add canopy. Mount landing gear, tailwheel wire on ply pieces; cement in place between fuselage sides. Cover fuselage bottom with 1/8 in. sheet.

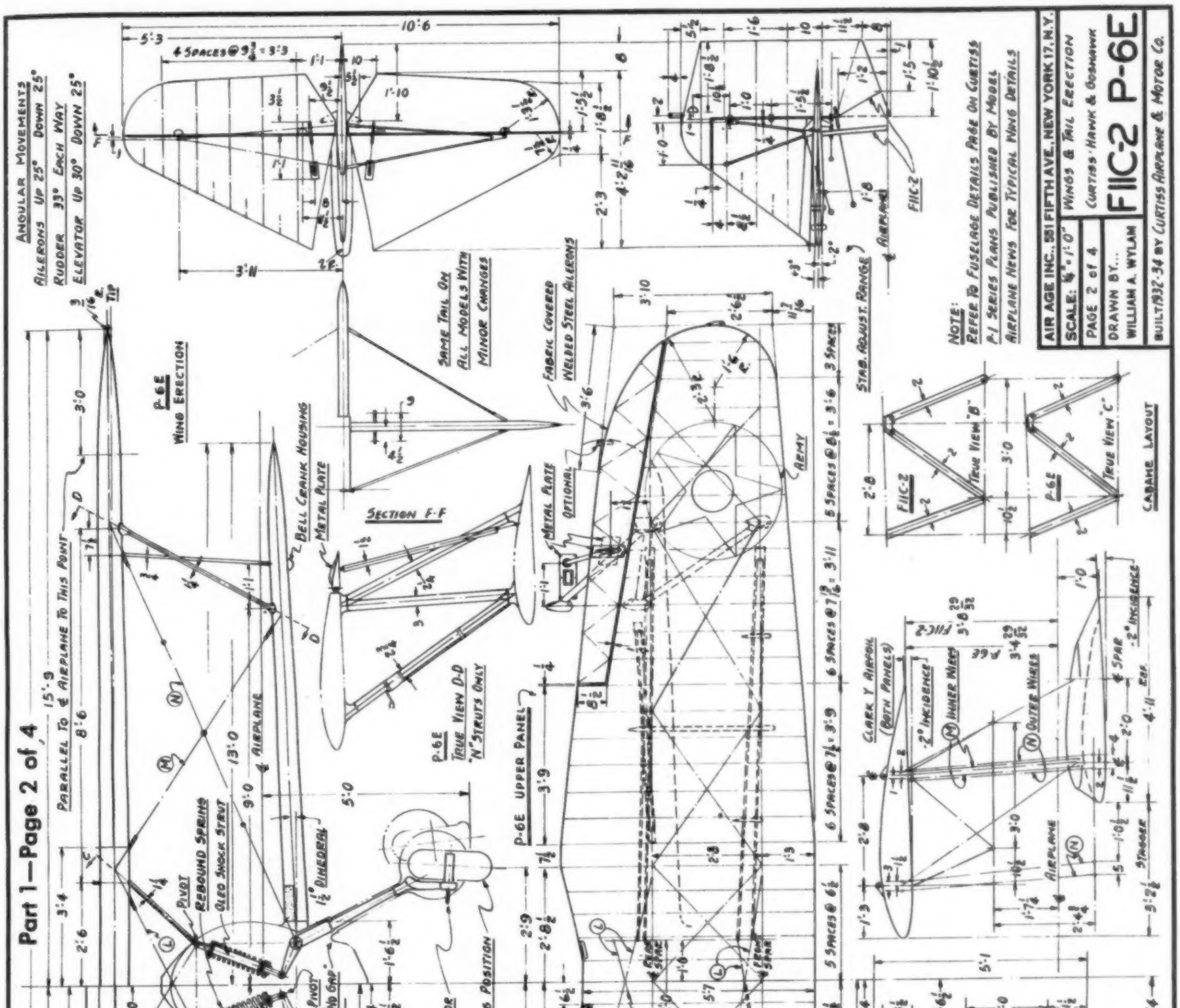
Sand entire model. Original model was covered with red silk. Apply about 12 coats of good Nitrate dope to entire model, then a coat of Butyrate.

Ship balances at the point marked by large black arrow. Add nose ballast if tail heavy. Since the high lift section makes ship "lively," take it easy on first flight. END

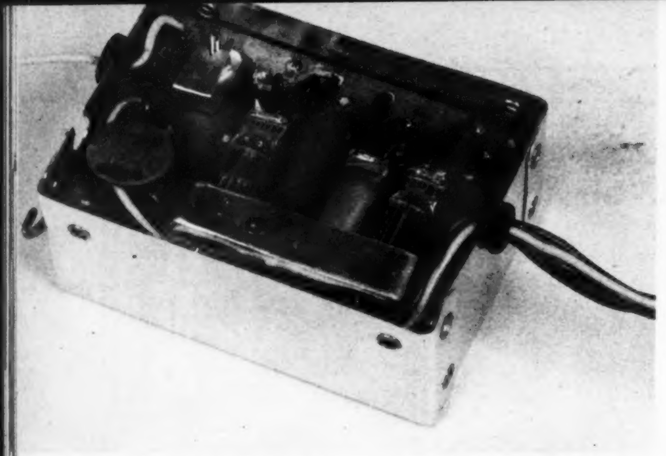


FULL SIZE PLANS AVAILABLE. SEE PAGE 50.

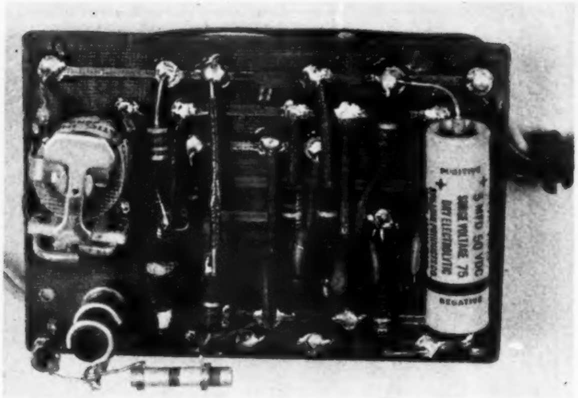

AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: ⅛"=1'-0"
PAGE 1 OF 4
DRAWN BY... WILLIAM A. WYLAM
FUSELAGE LAYOUT & DETAIL
CURTISS HAWK & GOSHAWK
F11C-2 P-6E
BUILT 1932-34 BY CURTISS AIRPLANE & MOTOR CO.
3" SQUARES THRU-OUT
Part 1—Page 1 of 4



Part 1—Page 2 of 4
ANGULAR MOVEMENTS
AILERONS UP 25° DOWN 25°
RUDDER 33° EACH WAY
ELEVATOR UP 30° DOWN 25°
P-6E WING ERECTION
F11C-2 WING ERECTION
SECTION F-F
SAME TAIL ON ALL MODELS WITH MINOR CHANGES
FABRIC COVERED WELDED STEEL AILERONS
P-6E UPPER PANEL
F11C-2 UPPER PANEL
P-6E TRUE VIEW D-D "N" STRUTS ONLY
F11C-2 TRUE VIEW A-A "N" STRUTS ONLY
NO FAIRINGS
TWO M-3 BOMBS
NOTE: SHOCKS WERE ABSORBED BY SHOCK (OLEO) STRUT. REBOUND WAS EXPANDED BY SHOCK ABSORPTION. FAIRING PANEL OPENS & CLOSED DURING STRUT MOVEMENTS; CLOSED IN FLYING POSITION. (SEE NOTE "NO GAP").
FLYING POSITION
SAME LOWER PANEL ON ALL MODELS
METAL AILERONS (NAVY)
TRANSPARENT PANEL FLOATATION (METAL PANEL)
CLARK Y AIRFOIL (BOTH PANELS)
CABANE LAYOUT
TRUE VIEW "B"
TRUE VIEW "C"
VIEW E-E
TURNBUCKLE CLAMP
STAB. ADJUST. RANGE
NOTE: REFER TO FUSELAGE DETAILS PAGE ON CURTISS P-1 SERIES PLANS PUBLISHED BY MODEL AIRPLANE NEWS FOR TYPICAL WING DETAILS
AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: 1/8"=1'0"
WINGS & TAIL ERECTION
PAGE 2 of 4
CURTISS HAWK & GOSHAWK
DRAWN BY... WILLIAM A. WYLAM
F11C-2 P-6E
BUILT 1932-34 BY CURTISS AIRPLANE & MOTOR CO.

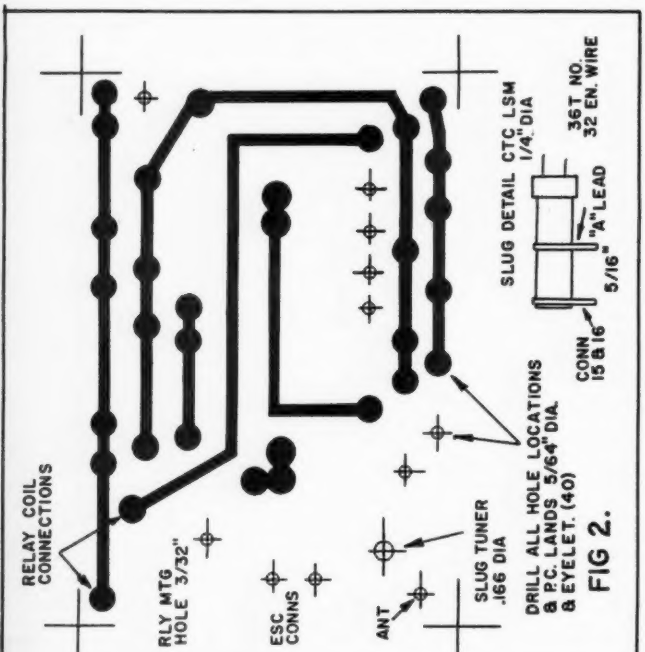


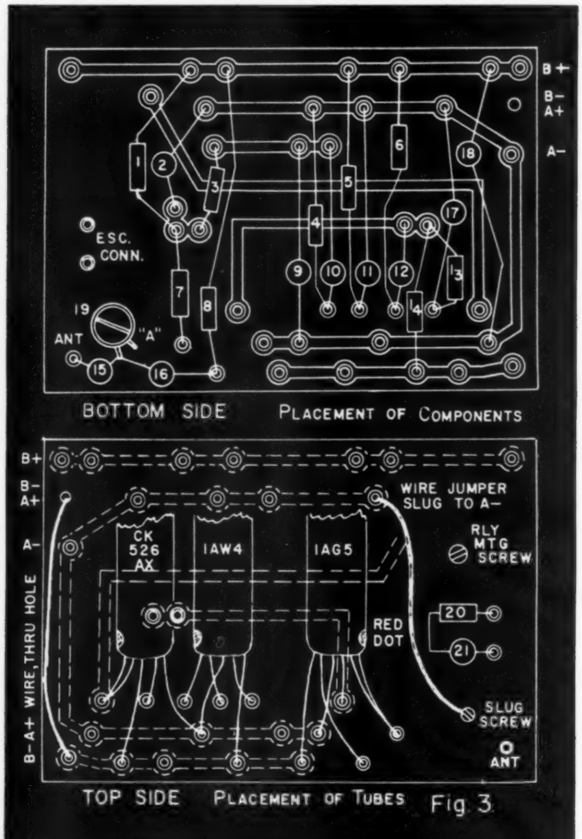
Underview of tone modulated receiver by L. R. Purdy, Smyrna, Ga. It is miniaturized and used printed circuit. Other pic, drawings, on this page.



Orderly, compact layout of components is a feature of the Purdy receiver. This is not a full fledged construction article, but tinkerers welcome.

Radio Control News



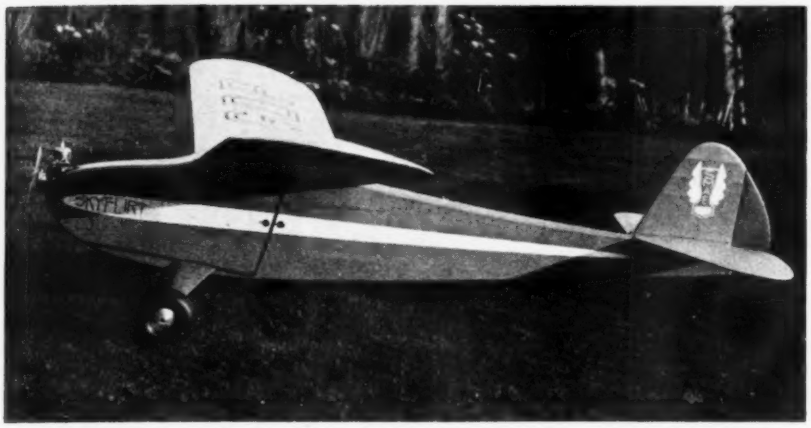


By E. J. LORENZ

The Purdy tone receiver, technical topics, new products, club items and, if you prefer to read, some long hair stuff will please the radio bugs.

▶ At the last minute this month, we juggled around copy to bring you some views on the new AMA rules for RC contest flying. The letter that touched it off came from Claude McCullough, Chairman of the AMA Contest Board. It was bolstered by comments from Geoffrey Pike in England and from clubs and individuals around the country. The Los Angeles Radio Controllers voted 65-3 in favor of a rules amendment.

By now you've probably guessed we're referring to the rudder-only versus multi-channel flying. First of all, it was the intent of Dr. Walter Good, and we believe that almost everyone will agree, that the rudder-only class was to encourage the entry of novice fliers in competition. It is felt that this is perhaps one of the best ways of getting new fliers into competition. However, it greatly hampers the flier who wants to go beyond rudder-only but doesn't have the pocket book for multi-channel sets. It also suppresses ingenuity in the builder. As was originally pointed out, anyone can get rudder, elevator and engine control with a five-channel receiver. To do the same with but one RF or AF channel is another thing. True, the degree of control may not be the



Looks cute, eh? Brace yourself, it's a 15 pound, 10-1/2 footer by Geoffrey Pike, England. An Anderson Spitfire with two-speed ignition hauls it upstairs. Design noteworthy for its functional simplicity.

Pike has a way with a crate, all right. This one, a six-footer, four channels, two on rudder, two engine. Big job has three-channel receiver.

same, but it is an accomplishment to perform all three functions with only one receiver relay.

And when you stop to think of it, the present rulings will tend to restrict the type and size of plane. It is highly improbable that a Half-A model will carry a five-channel receiver, but a Half-A model is capable of having rudder, elevator and engine control from a single channel. It all boils down, at present, to a few more prizes to have three groups instead of two. Why not a rudder-only, single channel and multi-channel? Rudder-only should be rudder-only and in itself will allow the novice to compete on an equal basis. Single-channel will consist of one RF or AF actuated relay in the receiver. What can be obtained from the points on this one relay will depend on the ingenuity of the builder. Multi-channel is self explanatory.

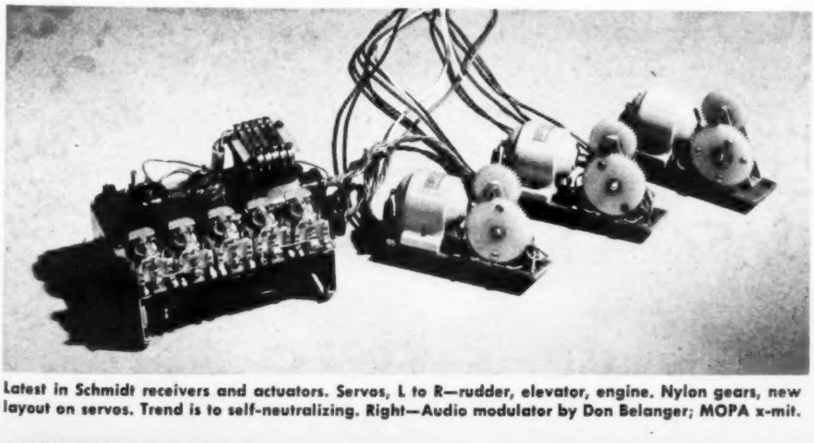
All clubs and individuals are requested to write to Mr. McCullough c/o AMA at 1025 Connecticut Ave., N.W. Washington, D. C. and make known their feelings on this subject. Those in power who may bring up the point of having RC divided into three groups instead of two should look to the rubber-powered and free flight gas groups as an example of multiple classes. It may be apparent in the near future that the rudder-only and single-channel can be combined. However, for the present, we feel that three groups are needed. Write in right away on this and be sure to register your transmitter with the FCC. We can't get another band without the cooperation of all RC fliers.

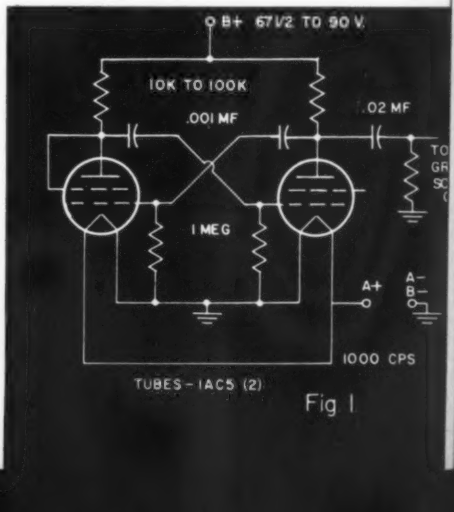
From Donald S. Belanger, a member of the Illinois Modeler, 2222 Brown St., Alton, Ill., comes Fig. 1. This is an audio modulator unit which will modulate practically any MOPA transmitter with a 1,000 cycle note. This particular set-up uses .6 watt of power, including filaments. This idea should work out well for a sub-miniature hand-held transmitter for boat use.

The main feature from our readers this month is a three-tube tone actuated receiver by L. R. Purdy, R. 1, Smyrna, Ga. This unit is based on Walt Good's design and should use the same type of transmitter for optimum operation. This design has been tested at a ground range of two miles and the construction should be quite simple, if Figs. 2 and 3 are followed. All holes on the pattern are eyeletted and the only critical parts are as follows: Parts 7 and 8 must be 1/4 in. above the base and Parts 15 and 16 should be kept 1/4 in. from the slug. The photo shows the component layout.

The printed circuit may be made by following the instructions we gave in the May and June '54 issues of MAN. If you so desire, you may obtain a kit for making this and other patterns from Lomar Products Co., Willow Grove, Pa., for $4.95. The Prop Shop, Box 329, Smyrna, Ga. can furnish ready made etched cards and eyelets. When soldering in the tubes, grasp the wire leads near the glass on the tube with a pair of pliers to absorb the heat. Use spaghetti on all tube and component leads where possible. Statistics on performance: A drain 110 ma; B idle 3 ma, with signal .3 ma. Total weight 3 oz. Use two pencells for the filaments and two 22-1/2 volt hearing aid batteries, in series, for the B-plus supply. Range is one mile minimum with 1 watt transmitter and the receiver will pulse up to 10 cps.

Last month we reviewed a few points on why the correct value of resistor and capacitor should be used and how to make proper choice of value. Now we'll go over the tuning coil and RF chokes, as commonly used. (*Continued on page* 39)



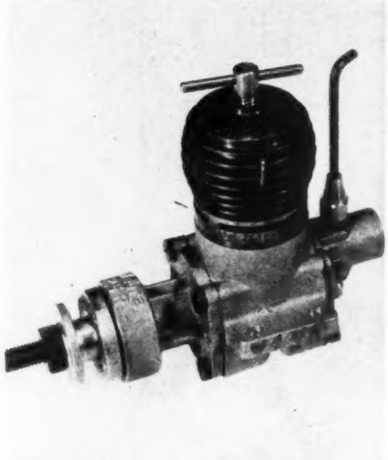


Latest in Schmidt receivers and actuators. Servos, L to R—rudder, elevator, engine. Nylon gears, new layout on servos. Trend is to self-neutralizing. Right—Audio modulator by Don Belanger; MOPA x-mit.

TESTOR CHEMICAL COMPANY • ROCKFORD, ILL.

Webra Piccolo .8 cc, or .049 Diesel, is neat, simple and looks somewhat like Atwood Wasp.

David Andersen .15 Diesel, a Norwegian product, is old fashioned performer, exquisitely made.



Webra Mach 1, double ball bearing German racing Diesel, very high rpm. Surprise is easy start.

Import Review

By E. C. MARTIN

From the world's hottest Diesel to the best-ever-built workhorse engine, this month's selection of foreign motors abounds with interesting dope.

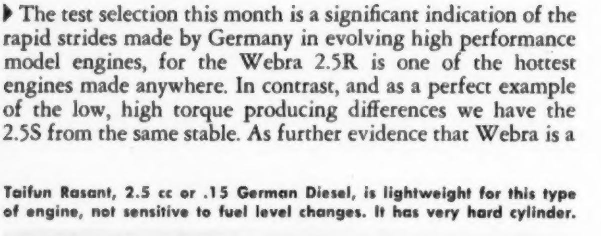
▶ The test selection this month is a significant indication of the rapid strides made by Germany in evolving high performance model engines, for the Webra 2.5R is one of the hottest engines made anywhere. In contrast, and as a perfect example of the low, high torque producing differences we have the 2.5S from the same stable. As further evidence that Webra is a name to respect there is the little Piccolo, an .049 of excellent performance. For comparison there is the Taifun Rasant 2.5, which features an interesting approach to radial porting, and hails from the same country, and as an outstanding illustration of fine finish and precision workmanship the Norwegian David Andersen 2.5 provides dignity and long life for those with less competitive leanings.

Webra 2.5R Mach 1 (.15)

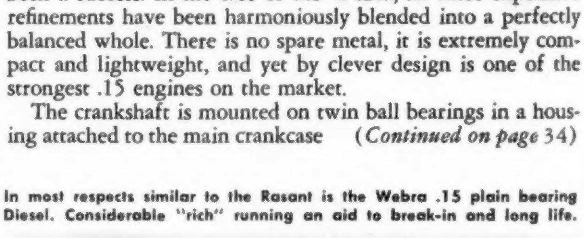
Every feature of this engine suggests high performance and since it has most of the recognized mechanics of contemporary racing engines, it would be disappointing if the Mach 1 were not a little out of the ordinary. However, we have seen such engines before and, contrary to expectations, they have not been a success. In the case of the Webra, all these expensive refinements have been harmoniously blended into a perfectly balanced whole. There is no spare metal, it is extremely compact and lightweight, and yet by clever design is one of the strongest .15 engines on the market.

The crankshaft is mounted on twin ball bearings in a housing attached to the main crankcase (*Continued on page* 34)

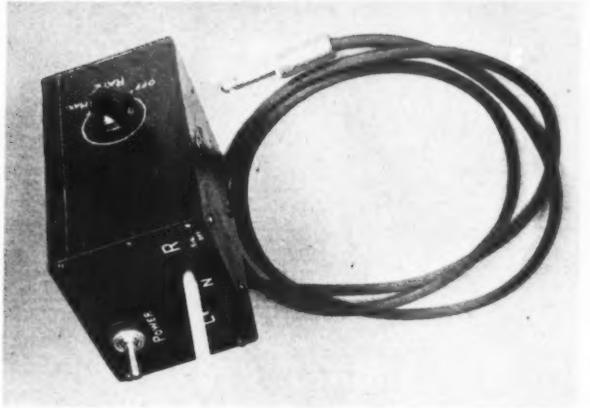
Taifun Rasant, 2.5 cc or .15 German Diesel, is lightweight for this type of engine, not sensitive to fuel level changes. It has very hard cylinder.



In most respects similar to the Rasant is the Webra .15 plain bearing Diesel. Considerable "rich" running an aid to break-in and long life.



Proportional Beep Box



This simple proportional pulse control box is noteworthy for its simplicity and lack of those annoying "coffee grinder" noises. You can make it.

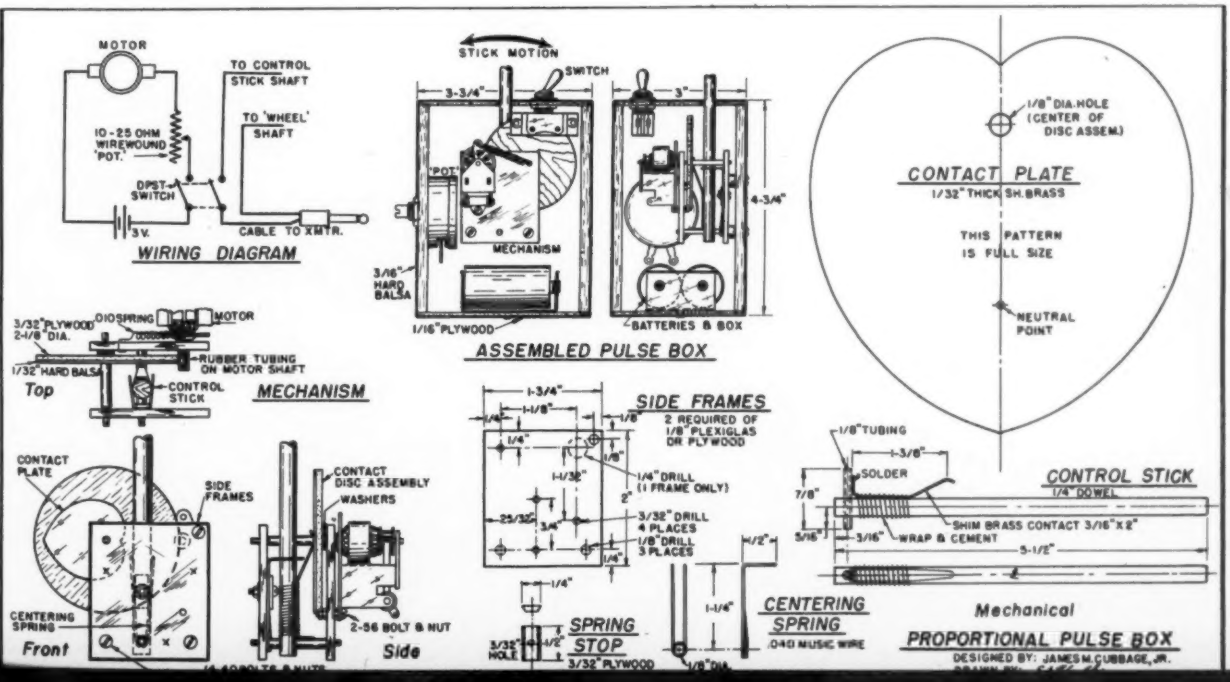
By JAMES M. CUBBAGE, JR.

▶ One of the frequent complaints about proportional pulse control boxes has been the mechanical complexity of the box and the annoying "coffee grinder" noise produced by the speed reduction gears. The proportional control box described herein was designed to reduce the number of moving parts to a minimum for ease of construction and to eliminate the unwanted grinding noise of the gears. The result is a quiet, reliable pulse box that can be built from odds and ends in a modeler's scrap box with a small amount of effort. The cost of the parts involved is practically nothing if the builder has a suitable motor lying around.

Start construction by cutting a 2-1/8 in. diameter wheel from 3/32 in. plywood. Be sure the wheel is as round as possible; however, a small amount of eccentricity of the wheel can be absorbed by the motor spring. Next, cut the heart-shaped contact plate from 1/32 in. brass. If brass isn't available, a piece of heavy tin can stock will do. For those who are interested, the heart shape is formed by a Spiral of Archimedes and gives a linear change in pulse length when the contact point moves along the center line. Mark the neutral position and drill the 1/8 in. hole as shown. Insert a 3/4 in. length of 1/8 in. O.D. brass tubing in this hole and solder in place. Be sure the contact plate is perpendicular to the tubing and that the tubing projects 3/32 in. from one side of the plate.

Cut a heart-shaped hole in a piece of 2-1/4 in. square, 1/32 in. hard balsa to make a snug fit with the contact plate. Cement the contact plate and balsa wood to the plywood wheel so that the short end of the tubing goes through the wheel. Before the cement sets, check to see if the wheel runs true and, if it doesn't, a little bending here and there should do the trick. When the cement is dry, trim away the excess balsa around the wheel and sand the surface until the balsa and contact plate are flush with each other. Coat the balsa with two coats of cement and sand smooth. It is advisable to add a piece of brass to the other side of the wheel, 180° away from the point of the heart, to bring the wheel into balance.

Cut the two side frames from 1/8 in. plexiglas, micarta or plywood. Metal side frames should be avoided as they would require the wheel or stick to be insulated against them. Locate the holes according to the drawing, clamp the two side frames together and drill the size holes as indicated. Note that the 1/4 in. hole for the motor shaft needs to be made in only one side frame. Assemble the two side frames using 7/8 in. long spacers cut from 5/32 in. O.D. (1/8 in. I.D.) brass tubing, and 1-1/2 in. long 4-40 screws and nuts. These extra long screws are available at your hobby shop in the small cellophane "Perfect" packages. Next, mount the wheel in the frame using a 1-3/8 in. long (*Continued on page* 51)



P. G. F. CHINN

FOREIGN NOTES

A monthly world-wide round-up of technical developments, designs, significant industrial products.

by P. G. F. CHINN

France: Important FAI Meeting

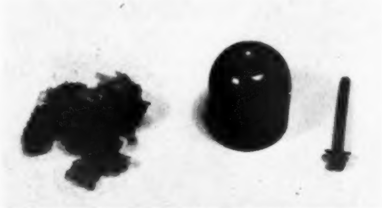
"This FAI stuff—it's all a mystery to me..." So say most of us. We know that FAI stands for *Fédération Aéronautique Internationale* and that its organization contains an international model committee. Beyond that, John Q. Modelbuilder is a bit hazy.

The FAI Model Aircraft Commission consists of members delegated by the model aeronautics governing bodies in various countries, such as the AMA in America and the SMAE in Britain and the national aero clubs in other countries. It is a sort of modeling United Nations which, we are pleased to report, seems to get along pretty well and without walk-outs, propaganda speeches and vetoes. Last December the committee met in Paris and present at this meeting were representatives of Austria, Belgium, Czechoslovakia, Great Britain, Germany, Italy, Holland, Saar, Sweden, Switzerland, the U.S.A. and the USSR.

The presence of delegates from Russia adds interest to the report of this meeting. Both Israel and Russia put forward proposals for centralized World Championships for all classes of models. This idea has been in the minds of many of us on both sides of the Atlantic. The 1955 World Championship rubber and gas (Wakefield and FAI Power) events are to be held at a USAF airfield in Germany, September 4 and 5, the U.S.A. and Australia foregoing their prerogative in order to ease travel difficulties for most of their opponents. Unfortunately, this good example did not encourage France and Germany to pitch in with the controlline and A.2 glider championships (which they won in 1954) so the idea of a centralized World Championships for 1955 did not materialize. The C/L Internationals will be held in Paris on May 29 and 30 and the A.2 glider International at Brunswick, Germany on August 28 and 29. Germany has reversed its decision about not joining in with the U.S.A. on the World Championships. Apparently, if the American authorities agree, the Germans will contribute the A.2 Swedish Cup event to the Wakefield and FAI Power, canceling the previously scheduled Brunswick meet.

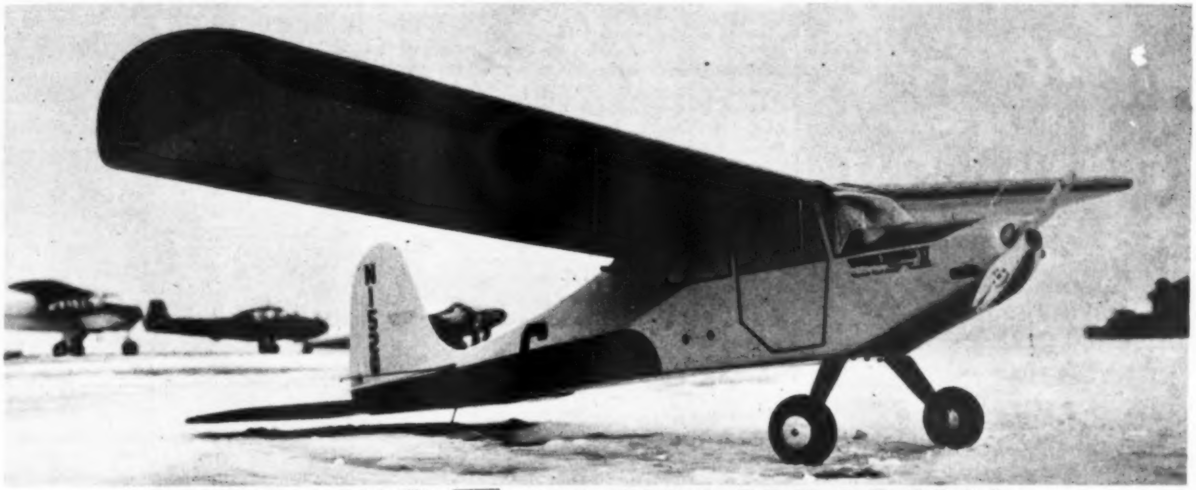
The Russian proposal was for a biannual world event and included the suggestion of national teams of four contestants only: one for each of the four Championship classes. This is the system adopted at the Eastern Internationals and certainly throws a much heavier responsibility on the individual members in representing their respective countries.

The question of a centralized World Championships will undoubtedly be raised again at a future meeting of the FAI Model Commission and, regardless of whether future developments secure the cooperation of countries concerned in getting together for such an event next year, it seems likely that the appropriate clause in the present *Code Sportif* (the Commission's international book of rules), which remains in force until Dec. 31, 1956, (*Continued on page 34*)



Bad example of Diesel fuel gumming by poor formulation. Article explains this, other faults.

Japanese Puss Moth set controlline endurance, no refuel, of almost two hours. Wing edge tank.



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- 2 big full size detailed plans with instructions!
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Wing area: 600 sq. in.
Bare model weight: 30 oz.
Flying weight: 3 to 5 lbs.
Power: .15 to .19 engines

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Foreign Notes

(*Continued from page* 32)

will be suitably amended to take effect from 1957. The most favorable alternative to the present system would appear to be to appoint, on a rota basis, those countries willing and able to organize a multi-event Championship meeting, so that future locations would be known and could be prepared for well in advance.

Among other decisions taken by the Commission were the adoption of a revised line length for Class I (.15 cu. in.) speed and team racing, which is now increased to 52-1/4 ft., in view of the high speeds now being achieved by models in this class.

Japan: C/L Endurance Record

A controlline endurance record of under two hours by a Japanese model might not look particularly impressive beside some of the dawn-to-dusk marathons currently indulged in. The difference, however, between the Japanese model (illustrated here) and the marathon jobs which have been refuelled via lines from the center of the circle) is that the Japanese model carried all its fuel for the flight and, moreover, carried it in internal tanks.

The model used was a semi-scale design and is stated to have been based on the DH Puss-Moth. A resemblance will be noted in the after-fuselage section, wing roots and cabane. The power unit was a Japanese-built O. S. Super-60 and the flight lasted 1 hr. 56 min. Tanks were located behind the engine, in the cabin and in the wings and totaled some 2-1/2 liters capacity—nearly 4-1/2 pints of fuel, which according to our calculations, must have weighed about 75 oz.

Germany: Webra Piccolo Motor

The Berlin-built Webra Piccolo, .0475 cu. in. displacement, to fit U. S. Half-A class, looks, despite its Diesel compression screw, more like an American .049 than any imported motor seen so far. Engine is compact, short stroke (.413 in. x .354 in.) radial mount job and weighs 1.7 oz. Featured is an unusual cylindrical tank of soft translucent plastic which is mounted on an aluminum plate for attachment to rear cover. We have one complaint about this motor: the tank smells abominably. Remedy is to put some fuel in it.

Austria: "Weather Too Good"

That tireless A.2 expert from Vienna, Oskar Czepa, has been experimenting with a new design and two new types of airfoil and reports the utterly fantastic (February) performance of 4:20 on one model and 5:20 on the other *using only* 60 *ft. of towline.* The weather was "too good," he says, (an understatement, Ossi), so results were quite useless. He would be satisfied to reach such times under normal conditions with the regulation 164 ft. towline. So, we imagine, would all Ossi's rivals for A.2 honors. Czepa, it will be remembered, won the World Championship glider event in 1951, flying his revolutionary Toothpick design.

Australia: A Warning on Plastic Props

The New South Wales M.A.A. Monthly Bulletin, which we mentioned in the April FN, carries a warning on plastic props, following a serious accident to a member's eye when one of these props threw a blade. Now this isn't exactly an isolated case: thousands of plastic props have disintegrated since they were first introduced for gas engines about seven years ago and quite a few people, to our knowledge, have been hit by flying blades, but, as always, it takes a bad accident, unfortunately, to focus attention on the possible consequences of not obeying the rules.

Personally, we think that the plastic prop manufacturers would do well to sell all such props in cartons, thereon to print the engine types and sizes for which specific props are intended. The modern tendency has been to run engines at higher and higher speeds on smaller props and that is where the trouble starts, for the immense centrifugal force set up by the rotating blade mass becomes too much for the tensile strength of the material.

Plastic props are okay on .049's, especially the hard type as supplied (such as the Kaysun) with certain of the popular Half-A engines. We have never experienced a blade blowing on one of these at normal speeds of around 12,000 rpm or so, at which they are called upon to operate. With the bigger prop-engine combinations and especially with nylon and soft flexible types of props, it is wise to be cautious, as the strength of the material is not scaled up in proportion to the centrifigal loading, because of greater blade weight.

Incidentally, mere over-revving, or flaws in the prop material, are not the only causes of failure. Heat, conducted to the blade roots via a hot crankshaft, can soften and weaken the plastic. Alternatively, bad engine vibration transmitted to the material can similarly cause failure. Therefore, we are prompted to repeat two of the warnings contained in the Australian bulletin, which are: (1) stand *behind* the motor when the prop is turning; (2) when in doubt, do without.

These remarks do not, of course, apply to plastic coated wood props.

Europe: Diesel Fuels

If anyone still doubts (following our comments here in May, 1954) that Europeans enjoy no advantages over their American cousins in regard to available commercial Diesel fuels, let him have a look at our third photo. Mess on left is congealed fuel extracted from a Diesel which had been left idle for a few weeks. Of course, one shouldn't leave fuel in engines, but the same brand will also coagulate similarly in bottle or can, forming jellied lumps which block up jets. Coagulation of this sort, in our experience, is generally caused by use of amyl-*nitrite* (note the "i") in castor base mixes. Better to use amyl-*nitrate* additive.

In Brief . . .

Hungary: New World record claim by Hungary in FAI Class III Speed (.61 cu. in.) is for 255 km./hr. (158.6 mph). McCoy .60 motor used.

Italy: As hinted earlier, Italian Super-Tigre manufacturer is entering Half-A class. Designer Garofali tells us that these are types G.28 and G.29, of .029 and .049 cu. in. displacement respectively, and will be available in both glow and Diesel versions.

England: We have a prototype Elfin BR. 2.49 on test for the manufacturer. Alternative types of reed valve being tried. Motor has twin ball-bearing shaft and is best looking Elfin yet. END

Import Review

(*Continued from page* 30)

casting by four screws, and located in concentricity with the crankcase bore by a projecting boss which houses the rear bearing. The cylinder screws into the main casting with a copper gasket between the joint at the port flange, and is threaded at the top for the green anodized aluminum head. While this is conventional European radial port cylinder design, the stroke bore ratio of .83 and no less than eight internal bypass grooves with less than 1/16 in. lands between them extend convention to what must be its logical end. As a result of such a short stroke the exhaust ports are only 1-1/2 mm wide and derive their area from circumferential length gained from the large bore. Unlike most hardened cylinders, this component is really hard and cannot be touched with a Swiss file, which, in conjunction with a sturdy cast iron piston, should prove very durable even at the very high speeds of which the engine is capable.

The conrod is a massive machining from

aluminum bar stock and terminates in large wrist pin and crankpin bearings, the latter being retained by a tight fitting aluminum flanged extension which drives the disc rotary valve.

The rear cover incorporating an intake of moderate bore is retained by four screws and provides a bearing for the large opening rotor by means of a pressed-in pin. The needle valve assembly is of the separate jet and needle block type with tapered nut friction-ing device which gives positive control unaffected by vibration.

The contrapiston is ground to the bore and also holds its settings reliably. Sturdy beam mounts complete an engine that is destined to make itself felt in competition, for it is the highest revving Diesel we have seen, is easily started on small props, and stays on the bit despite fuel feed variations, and probably well exceeds .3 bhp.

World Engines, P.O. Box 905, Warren, Ohio

Webra 2.5S Winner (.15 Diesel)

This engine follows a design pattern which we have come to regard as typical .15 Diesel design, and similar engines in all but minor details are made in almost every model engine producing country, the first example to appear being the Series Two version of the well known Elfin 2.49. However, the popularity of this layout is the best possible evidence of its worth, and there is no doubt that for weight economy in relation to power, it is a set-up that is hard to beat in a plain bearing engine of this displacement.

At the beginning of this article we referred to this engine as a low rpm, high torque design, and in relation to the Mach 1, K & B .15, and Supertigre G.20, it is; and yet it has been only three years since this layout was the hottest formula in the field, and it only qualifies as the result of yet another step forward in engine design. The David Andersen, described later, is an example of even older concepts, and because all good engines have their virtues and limitations, and because no one engine can cover the gamut of various performance requirements, there is still sufficient demand for these older design principles to justify their incorporation, with refinements, in new productions, simply on the grounds that they can do things that the new jobs cannot.

The Webra 2.5S is a shaft rotary, plain bearing, radial ported Diesel having a gravity die-cast crankcase with screwed-in liner which is threaded at the top for an aluminum cylinder head, and a screwed-in rear cover. The intake bore is on the small side and is supplemented by sub-piston induction. Four 2 mm wide exhaust ports and four internal bypass grooves in conjunction with a longish stroke produce useful torque at moderately high rpm, while also in the neighborhood of 1/4 bhp, which makes the engine a very good compromise for most applications, especially in view of its light weight.

Workmanship is of high standard and all parts are well proportioned for strength and wearing qualities. The ratchet needle valve is reliable, though the performance is sensitive to fuel level variation, and the compression adjustment holds its setting without creep. The beam mounts are sturdy, and vibration is reasonable for an engine of this type with a full crank disc, our only criticism being the size of the prop driver which is on the small limit for the power developed.

World Engines, P.O. Box 905, Warren, Ohio

Taifun Rasant 2.5 Diesel (.15)

The 2.5 Taifun Rasant is a reminder of the past in the respect that it comes complete with wooden test block, spinner nut and bar wrench. In many ways it is similar to the Webra described above. The displacement, bore and stroke are substantially the same, the carburetor assembly is almost identical, and there is little to choose between the over-all dimensions. However, the Taifun is slightly

(*Continued on page* 38)

By Sterling—In PLASTIC!
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lighter, is less sensitive to fuel feed variations, and has a very interesting threaded cylinder attachment. Again, the cylinder is really hard, and a cast iron piston of slightly heavier sections than that of the Webra is used with a machined aluminum conrod. Proportions are so similar on these and other engines of different manufacture, that if all the designers really did carry out research and came up with these same proportions, one can only conclude that both these engines are of unusually sound and well proven construction.

The Taifun cylinder has no flange and is a parallel tube threaded at both ends with four radial exhaust slots between the threaded portions and four internal bypass grooves milled in one end of the bore. The crankcase casting is threaded to receive the cylinder, the bottom rim of which butts up against a shoulder at the bottom of the crankcase bore with a gasket in between. The result is a useful saving of weight and more uniform expansion of the cylinder than usual with the flanged type. Another feature of the Taifun cylinder is its shortness. At bottom dead center, more than half the length of the piston skirt is clear of the cylinder bore. As there is no load on the piston, provided the wrist pin bearing is free, this does no harm, and can be seen in several domestic engines, and possesses the signal advantages of lightness and reduced obstruction to gas flow.

In appearance the Taifun is very attractive with well finished pressure die castings and blue anodized head, prop driver and spinner nut. However, it comes in for the same criticism as the Webra inasmuch as the prop driver is a little small in diameter.

Wilshire Model Center, 1326 Wilshire Blvd. Santa Monica, Calif.

Webra Piccolo .8 (.049 Diesel)

When you first see this little giant you would be forgiven if you immediately concluded that Bill Atwood had gone into the Diesel business, for the Piccolo has the proportions and appearance of an Atwood Wasp. In performance and behavior this little Diesel also justifies this parallel since it seems to revel in revs, starts easily and responds in logical manner to control adjustments. We have discussed the good and bad points of this type of .049 in several previous tests, but not in Diesel form, and it was with particular interest that we ran this engine to see how the two bolt radial mounting on a small area backplate, with long crankshaft and consequent overhang, behaved in the matter of vibration with Diesel operation, as compared with our impressions of the same set-up on glow ignition.

Before committing ourselves, let us detail the virtues of the layout. We have extreme neatness and simplicity of form, great strength with no wasted metal and close to the minimum possible number of separate parts in the engine assembly, and consequently a high power-to-weight ratio. From the operating efficiency viewpoint we have everything a front rotary, radial ported engine needs, and it gives a neat and tidy appearance when mounted in a model. In fact, it is a layout that is almost ideal in every respect except for vibration and unfortunately this shortcoming is especially evident on this engine at all except very high speeds, but can be minimized or at least noticeably reduced by carefully balancing the prop. A very large number of modelers will prefer the good points of this design and accept the bad, rather than incur the extra weight and work of beam mounts, or the greater wear rate of a shorter main bearing, and for this reason the Webra Piccolo will meet the requirements of a lot of Half-A contest fans, since there is no question about its power output. The performance on the 6 x 3 wide-blade prop supplied with the engine is not equalled by an other .049 we have tested, and its small prop performance ranks with the best front rotary glow engines.

Finish throughout is attractive with etched pressure die castings and red anodized head.

As well as a prop, a special backplate is supplied which has tapped holes to correspond with the engine mounting bolts, and which goes behind the firewall of the airplane. To this plate is attached a soft plastic fuel tank of large capacity, which is fitted with two long pieces of transparent fuel tubing, and may be compressed to any reasonable shape to conform to the internal fuselage structure.

World Engines, P.O. Box 905, Warren, Ohio

David Andersen 2.5cc Diesel (.15)

There are people in this world who derive keen pleasure from handling and examining something that is superbly made. To such people anything is a rare and beautiful jewel, whether it be a queen's tiara or a mere can opener, provided it has penultimate quality and workmanship. Such an object is the David Andersen Diesel, and to those who understand the above sentiments, this engine will be a most satisfying possession. We have extolled the quality of certain engines in these columns on several occasions, but the David Andersen excels them all; indeed, it excels the quality of most of the manufactured goods any of us is ever likely to own. Modern thinking will say, "So what! Is it the hottest of engines? Does it do the job better?" The answer is no. The manufacturer claims .2 bhp at 9,500 rpm, which is honest and courageous, and the only job it does better is that of swinging large props in comparison with most modern .15's. It is not a competition motor.

The design layout of this engine is old fashioned, with small bore intake, separate jet and needle assembly, long stroke, conservative front rotary timing and small area opposed twin exhaust and intake ports, and the size and weight of a .29. The piston and cylinder are also old fashioned, inasmuch as they will hold compression for many minutes when set at tdc, and the engine will start hot or cold without priming.

The crankcase casting and prop driver are etched aluminum pressure die castings machined internally with tools which, judging from the finish, must have been ground and honed on their cutting edges by a master craftsman who enjoys his job. The main bearing housing has a similar finish and the bearing bore is honed dead parallel with just the right surface finish for long life and adequate oil retention. The 3/8 in. dia. shaft is so smoothly finished that a magnifying glass is necessary to see the wear pattern after running. The crankpin is hollow and 9/32 in. dia. with a similar finish and is fully counterbalanced.

Both rod bearings are honed, the small end being bronze bushed and connected to the piston by a hardened and ground wrist pin. Contrary to the instruction leaflet, a hardened steel cylinder and cast iron piston are used, with parallel bore and unrelieved piston skirt: The ports are rectangular in the case of the exhaust, and upward inclined elliptical, with a flat topped piston, in the case of the bypass. Again the standard of machining, grinding and honing is outstanding, and the contra-piston is an ideal fit. The cylinder head, incorporating a very sturdy and accessible compression lever, is machined to a push fit on the ground upper portion of the cylinder, and is retained by four long screws running into tappings in the crankcase port belt. The machining of the head is so good that it is difficult to see the tool marks and the fins have the appearance of being chrome plated.

Large sturdy mounting lugs are located slightly above the shaft center line and twin exhaust stacks extend across the width of the mounting lugs. Prop retention is by means of a 3/16 Allen screw and steel washer.

There is a saying that you would not harness a racehorse to a plow, and for those who want pulling power with low bearing loadings in an engine that will be a lasting pleasure, the David Andersen is a plowhorse of the finest pedigree.

World Engine's, P.O. Box 905, Warren, Ohio

END

Radio Control News

(Continued from page 27)

The exact tuning slug as specified in the circuit drawing must be used. Keep the same diameter form since incre:sing the diameter will increase the inductance of the coil, assuming the same size wire and number of turns are used. A smaller diameter coil will give a decrease in inductance. This may be compensated for by either increasing or decreasing the number of turns of wire used and also by varying the size of the wire. However, unless one has a grid-dip meter on hand, it is difficult to ascertain the exact results the designer obtained. Also, changing the wire size and number of turns, while it may produce the same inductance, may change the Q of the coil to a point where operation is erratic or impossible.

Next, the same type of powdered iron core must be used. Even with the diameter of the form being as specified, the type of iron core will affect the operation to a point where proper operation is impossible. In some cases, the coil-slug assembly has a brass slug attached to the powdered iron one. Generally, the brass slug is removed, since the presence of brass in a coil will decrease the inductance. All circuit schematics should specify the type of slug used. Cores obtained from surplus may work, but unless they are marked, it may be impossible to duplicate them. RFC's (radio frequency chokes) are often a source of trouble, even when the specified value of choke is used. A 10 microhenry choke of one make may work fine while four other makes of 10 uh chokes will not give the same result. This is often caused by the Q or distributed capacity of the winding or both. The Q of a coil is the quality factor and while it is too involved to go into at this time, takes into account the resistance of the winding.

Thus, a choke with more resistance through finer or more wire in the winding may not give the optimum performance desired al-

though it measures 10 uh. Distributed capacity, because of capacity among the wires themselves, will give a certain resonant frequency for the choke. Therefore, it can be assumed that any choke wound differently from that specified will have a different resonant frequency and hence give a different reaction in the circuit. It can be seen, then, that it is best to stick strictly to the type of choke specified, or to its approved equivalent. If you are unable to do this, be prepared to do a bit of experimenting until you hit the proper value.

CLUB NEWS

Art LaGrange of Poughkeepsie, N. Y., bothers the ducks with his Pittman Panther-powered, 36 in. RC cabin cruiser. A deBolt 3PN gives excellent control and a Lionel train reversing unit gives forward, stop and reverse for the third control.

Paul Runge of Ace Radio Control (Box 301, Higginsville, Mo.) is still giving circuit talks to the local KC/RC club. The club report is that in order to make a showing nowadays, good take-offs are imperative. Spot landings are also getting sharper.

L. F. Pepino, 4 W. Croxton Rd., London, Ont., Canada wishes to announce, on behalf of the Forest City Fliers Model Club, an RC contest scheduled for September 11. This is an annual event with everyone welcomed for this year's meet.

From Jerome Johnson of the Radio Control Club of Chicago, 10805 S. Sangamon St., Chicago, comes the news of their 25 club members and of the five multi-channel ships under construction. At every club meeting, they have regular radio classes, conducted by one of the 3 ham members. They have a solution to the traffic problem on 27 mc, which is as follows: there is a metal tag with 27 painted on it, and in order for anyone to fly on 27 mc, or even tune up, he must have the tag. The order in which the tag is passed on is the same order as he gets on the list when he comes out to fly. Jerome says this works out all right but we don't see why a fella has to have a tag to press a key accidentally. Quite a successful scheme along this line is in use by the Southeast Virginia Radio Control group, whereby *all* transmitters are placed in a line, about 12 to 15 ft. apart. *All* antennas are left off until the flier is ready to fly. In this way, a key which is accidentally depressed will not generally cause enough power radiation to be troublesome.

Jack K. Gilligan, 3427 Harrison St., Denver, Colo., has been doing some excellent flying with the multiple escapement manufactured by the D & D Manufacturing Co. (130 85th St., Brooklyn 9, N. Y.). This is quite a novel unit, having been written up in the November '53 issue of MAN. Since Jack's unit was in use for about a year and a half, using 1/4 in. instead of 1/8 in. rubber, it speaks well for the workmanship which went into his multiple escapement.

This next report is something we've been awaiting for about a month: the latest tape from Geoffrey Pike, in England. First, a brief summary of his recording. The ECC 951 is about the most popular single-channel unit in England and the ED multi-channel, being the only equipment of its kind, takes care of the multi-channel field. There appears to be no great problem of interference from outside sources, since the British band is not hemmed in as is our 27 mc band. He spoke of pneumatic actuators being quite reliable and work is being carried out by several groups on this item. The crankcase compression furnishes power for moving the controls and valving is done through relays or reeds. We don't know what kind of control you would have with the engine not running but we'll find out and get more details on this. The photo shows his Skyflirt, which is a 10-1/2 ft. model weighing 15 lb. An Anderson Spitfire, with two-speed ignition, hauls it up. An ED three-channel reed unit controls the rud-

der and engine speed, and the tail wheel is linked in with the rudder for good ground control. Another photo shows Mr. Pike with his latest 6 ft. model with a four-channel receiver. Two channels for rudder and two for engine speed and the engine speed control is capable of going from high to low speed in less than one second. At present he is working on a non-fly-away system, whereby it is hoped to spiral the model down when the receiver gets no signal within a period of one minute.

Ralph Brunson of Poughkeepsie, N. Y., showed us some beautiful movies of his steam-powered RC boat. This 36 in. model carries a 1 cyl. steam engine having a cruising pressure of steam of 50 lb. An ECC receiver handles the radio end and extremely smooth throttle control is obtained with steam power. Quite a sight and something out of the ordinary. Do we have any other RC steamers around?

Third Annual Great Lakes Regional RC Meet, June 25-26, first day in club field, last day at Ford Test Track, Dearborn (old airport) in conjunction with Exchange meet, which has no radio event. Although Exchange meet limited to Michigan residents, RC meet open to residents of U.S.A. and Canada.

NEW ITEMS

The Hercules Chemical Co. of New York City has produced a real 50/50 tin-lead solder, in paste form, which enables you to make solder joints with only the heat of a match. This is the best solder of this type we have ever used and found that the cigarette lighters that produce a small jet of flame did an A-1 job on even small components. No need to carry a soldering iron in your tool kit when, for 59¢, you can get a tube of Swif. Available at hardware and plumbing counters.

From Ectron Products Co., Box 393, Smyrna, Ga. comes the latest in compact battery boxes. A real triple threat unit, measuring 1-1/8 x 2-9/16 x 2-7/8 in. and selling for $1.65, this lightweight aluminum case will handle either two 22-1/2 volt batteries and six pen cells or three 22-1/2 volt batteries and four pen cells. Dependable operation is obtained by individually spring loading each contact point with generous size surfaces and 1/4 in. of good spring pressure. One of the best items of this kind we've seen in a long time and it's just the thing for a compact and neat installation.

Citizen-Ship Radio Corp. (P.O. Box 5971, Indianapolis 20, Ind.), offers their 27 mc receiver in etched wiring, more commonly known as printed circuit form. This form of construction is rapidly gaining popularity and it provides the nearest thing to foolproof construction. While on the subject of printed circuits and etched wiring, we've had several requests for information as to how to produce etched wiring cards on a commercial scale. It is not our policy to delve that deeply into a subject, but rather to show you what can be done on a small scale in your home workshop. However, for those desiring more information on the subject, you may secure a booklet entitled *Printed Circuit Handbook* by Methode Manufacturing Corp., 2021 W. Churchill St., Chicago. The price is $1 and there are many charts, sources of materials and other valuable information to make it well worthwhile.

For those interested in a de luxe kit for laying out and producing experimental etched wiring boards, prior to going into production runs, Methode has a really fine kit of pre-punched cards in various sizes, both single and double-sized copper, tube sockets, eyelets, etc. Not cheap at about $35 but just the thing for a club or for someone contemplating an item for the market.

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  STUMPY: .09 combat U-control.
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  SCRAMBLER: .29 team racer.
- ☐ **WIMPY:** .049 scale free flight.
  HIGGINS CABIN CRUISER: .09 - .19 boat.
- ☐ **HI BOY!:** Palmer stunt .29.
  HALF-A DELTA: Free flight delta.
- ☐ **SNIPE:** Half-A stunt.
  STRATOHAWK: Limited rubber.
- ☐ **SMARTIE:** .29 - .35 stunt bipe.
  PENNY: Outboard boat.
  LI'L SPEED MERCHANT: .049 speed.
- ☐ **SHOEHORN:** .049 flying boat.
  ALKIE IV: .049 free flight.
  QUICK 60: CD speed.
- ☐ **APACHE:** .049 free flight.
  FABULOUS HAWKS: .14 - .29 scale.
- ☐ **SHEIK:** .29 team racer.
  DRIFTWOOD: .049 free flight.
- ☐ **FOXY:** Aldrich .29 combat.
  BIG TIME: Large towliner.
- ☐ **SPOOKY:** .09 stunter.
  SLOWPOKE: .09 sport free flight.
- ☐ **EL DIABLO:** .19-.35 stunter.
  TRI-PACER: Scale ukie Piper.
  PLAY PLANE: All-balsa FF, .049.
- ☐ **HOT FOOT:** Stunt bipe, .29 - .35.
  DOUBLE FEATURE: Rubber — .049 combo.
- ☐ **LONG TOM:** .29 - .35 free flight.
  SIDEWINDER: .049 profile ukie.
- ☐ **GYRATOR:** .29 - .35 stunter.
  AERONUT: .19 free flight.
- ☐ **BOUNDER:** Record .29 speed.
  ZEPHYR: .049 free flight.
- ☐ **NOBLER:** Aldrich .29 stunt.
  FUNSTER: Hot .049 free flight.
- ☐ **SKY WING:** .049 flying wing.
  CHALLENGER: .29 team racer.
- ☐ **HOTTER 'N THAT:** .29 combat.
  SUPER SAUCER: Large towliner.
- ☐ **BEAVER:** .19 - .35 scale.
  ZENITH: Taibi A free flight.
- ☐ **HALF WILD GOOSE:** .049 free flight.
  FIRECRACKER: .29 scale.

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We received a few units of the new CG Electronics Corp's. new receiver and transmitters. Located at 305 Dallas St., N.E., Albuquerque, N. M., this firm is marketing a single-channel tone receiver, the R-1, and the transmitter for it, the T-12. Tests so far show the receiver to be quite sensitive and free from regular carrier interference. Very neatly built, this three-tube receiver utilizes a printed circuit and a protective covering of aluminum. The hand-held transmitter produces more than enough RF and AF power to operate over a distance of 3/8 mile on the ground. About the time this issue hits the newsstands, CG will have a two-channel transistorized reed receiver on the market. This is quite a compact and lightweight unit, since the company reports they have done test flying with a Live Wire Kitten. Their T-15 carrier transmitter is modified in a matter of seconds by installing an M-3 modulator unit and may then be used for multichannel control of the reed receiver. The R-1 receiver sells for $26.95 and the necessary T-12 transmitter for $31.95. This seems to be an ideal combo for RC boat control.

This month we have another multi-tester marketed by Aristo-Craft Miniatures and distributed by Polk's Model Craft Hobbies of 314 Fifth Ave., New York City. The current range goes down to 2 ma for checking low current receivers and up to 1 amp for checking escapements, etc. In between you have 10, 25, 50 and 500 ma for checking practically any receiver, transmitter or actuator current. The DC voltage scales cover 3, 10, 50, 150 and 300 volts, which will cover anything encountered in the power supply end of RC work. In addition, this 1-5/8 x 3-1/8 x 4-5/8 in. meter will also measure resistances in the range of 100, 10,000 and 100,000 ohms.

Electronic Specialties, 58 Walker St., New York City, now carries the seven-pin plug-shield and socket assembly we've mentioned before, the price being 45¢. Essco can also supply 10 microhenry chokes of the National type for 35¢. Substituting RF chokes can sometimes lead to trouble but we've found these work perfectly in place of the National jobs. 50 microhenry chokes are also available. Been looking for some real flexible hook-up wire for receiver or installation work? Then look no farther than Essco. Currently available in five colors, red, orange, yellow, blue and white, this 16-strand plastic coated wire measures about .050 in. in diameter and, as we said, is nice and flexible.

PARTS FOR PURDY RECEIVER

Part No.	
1	47k 1/2w 10 per cent
2	.001 mfd Erie 801
3	1 meg 1/2w 10 per cent
4	10 meg 1/2w 10 per cent
5	1 meg 1/2w 10 per cent
6	1 meg 1/2w 10 per cent
7	50 uh choke National R33 yellow dot
8	212 meg 1/2w 10 per cent
9	.00022 mfd Erie 811
10	.00047 mfd Erie 821
11	.01 mfd Erie 811
12	.00047 mfd Erie 821
13	10 meg 1/2w 10 per cent
14	10 meg 1/2w 10 per cent
15	1 mmf Centralab tcz
16	33 mmf Centralab tcn
17	.00047 mfd Erie 821 (leave out for pulse work)
18	5 mfd 50v electrolytic Sprague tva-1303
19	CTC LSM 1/4 in. coil form white dot
20	10 ohm 1/2w 10 per cent
21	.01 mfd Erie 811
	Relay-Neomatic 7250 ohm
	Tube No. 1, CK526AX; tube No. 2, 1AW4; tube No. 3, 1AG5.

END

...all about Jets

(*Continued from page* 21)

There are some frightening variables to consider in fan design. Some of the more important are: pressure rise, air flow, power input, rpm, diameter, hub diameter, number of blades, blade planform, blade twist, blade camber, blade angle, gap between blade tip and duct, flow straightening vanes and blade airfoil section. The particular fan we are considering seems to have a pretty good combination of all these variables, since its full scale version had an efficiency up to 85 per cent, with a very wide flow range and gentle stall, or surge, characteristics.

Some test results obtained in June, 1954 for a design of this type are presented in Fig. 20. The test set-up here consisted of: a 4-in. diameter fan with bellmouth inlet, a .149 cu. in. engine, and a conical tailpipe contracting to a 3.5 in. diameter. Eight adjustable aluminum blades were used, with roots about 20 per cent thick and tips about 12 per cent thick; blade twist was about 17°.

There were several factors involved that served to decrease the thrust observed from what might be expected: the air temperature was well over 100° F, which would decrease the piston engine power; there was an afterburner installed in the tailpipe contributing to the duct losses, since it was off for these tests; the flow straightening vanes used were not well designed. Furthermore, the particular blade design used is not considered the best: the root chord was too large and the twist too small. The results are encouraging, however. There is no question that this is enough thrust to fly a model, and fly it well.

3. *Mount Design:* Design of the motor mount is an oft-neglected problem. The mount must hold the engine rigid and concentric with the ring around the fan. A gap between the fan tips and the ring of as little as two per cent of the fan diameter can cause a loss of 20 per cent in the fan efficiency. The photo of Fig. 19 shows one satisfactory solution to this problem. When the engine is installed behind the fan (to keep the oil off the fan blades), it must serve one further purpose: that of a flow straightener. The flow leaving the fan has considerable rotation, usually from 5 to 30°, depending on the fan and its operating condition. Straight vanes will produce separation and pressure losses. The mounting struts should be curved, starting with the flow direction and straightening out to remove the rotation. This will increase the fan pressure rise and the engine thrust.

4. *Tailpipe and Exit Design:* Here we have a rather simple problem, for a change. All that is necessary is to make the tailpipe as short as possible and to contract smoothly to the exit area. Usually you will be safe if you allow the external contours to dictate the length and shape of the aft section of ducting. The choice of exit area is a trifle complicated, to be sure, since this controls the performance of the unit. Too large an exit will cause high flow velocity past the engine and mount, thus causing pressure loss and thrust loss. Too small an exit will cause the fan blades to stall, seriously, reducing the fan pressure rise and the engine thrust. If you wish to let the external contour of the duct dictate the exit area, the fan blade angle will have to be set to match.

If you have a fan of a given blade angle, you can find the proper exit area by this simple process: Make a tailpipe from a cone of light cardboard or sheet metal; keep trimming it down, measuring the thrust each time; use the area at which the thrust is found to be the highest. The blade angles and exit areas listed at the end of this article will serve as a guide. It is not too difficult to calculate the best area, if you know the fan characteristics, but we haven't space here to go into this problem.

5. *Afterburner Design:* The author has spent quite a bit of time running afterburners on model ducted fans (ground tests only), and can report that it is a lot of fun, but not very practical. Some of the more serious problems to be licked are:

1. The fuel. It must be safe, easily stored, and burn readily; 2. Fuel pumping. The fuel must be delivered to the AB somehow; 3. Fuel injection. The fuel has to be injected so that it will burn rapidly and completely; 4. Ignition. AB ignition must be prompt and reliable; 5. Pressure loss. There is an unavoidable theoretical pressure loss associated with burning in a duct.

The best afterburner developed solved several of these problems, but not all. Butane was used as a fuel. Butane burns beautifully and provides its own pumping, since it must be stored under pressure in the tank. The pressure is not too high to permit very light tank construction, however. Dropping a lighted household match down the igniter tube gave prompt ignition, although the inside end of the tube had to be designed carefully to keep the flame from shooting out of the igniter after ignition. This afterburner design is shown in Fig. 21. The aluminum ducting was protected by the insulating layer of cold air between it and the very hot afterburner flame. Now as far as the thrust boost is concerned—there wasn't any. With the afterburner fully on, the thrust was the same as with it off. Some configurations tested actually showed a decrease in thrust with afterburner on. It seems that problem No. 5, above, just can't be gotten around with this basic design. The flow velocities through the duct are just too high. If you want a good ducted fan afterburner combination, you will have to design a higher pressure rise, lower airflow system. We realized that this was the case before we even tested the afterburner, but we hoped that the hot and cold gases would not mix

so rapidly in the tailpipe. Calculations indicate that you can get a 40 per cent thrust-boost, using a properly designed set-up. The whole system gets so complex, though, it seems doubtful that model afterburners will ever get very popular. The ones tested by the author provided a lot of realism, even so. They came on with a satisfying, small scale roar, and at night the exhaust flame was really spectacular.

About all that is left to do is list what we have been able to achieve experimentally up to this time, in order to give you a target to shoot at. Don't be surprised if you can't get this performance at first. Quite often there is some little thing that you may overlook which will completely ruin the engine performance. On the other hand, don't be surprised if you do quite a bit better. These components were strictly home-made stuff, and while we were pretty careful, there were lots of things we could have done better.

Fan Dia. *inches*	Engine *cu. in.*	Exit Dia. *inches*	Tip Angle *degrees*	Static *pred.*	Thrust *meas.*
3	.049	2.5	30	9	6¼
3¾	.049	3.0	25	10	8
4	.149	3.5	37	23	14
4	.19	3.5	38	28	26
5	.19	4.0	38	30	—
5	.35	4.0	48	45	—

END

Triple Threat

(*Continued from page* 10)

undercamber. Hinges are 3/32 plywood with tubing bound on with soft copper wire and soldered. Make hub assembly as shown, with reverse S hook on prop shaft to prevent climbing. Cement hinges into back face of prop blades, then adjust angles so that blades fold flush. Do not change the angle of the hub in the plane perpendicular to the thrust line as this will change the pitch. Be careful when assembling this unit as it is the most important part of the whole model. Wrap hub and hinge together with strong thread and coat with cement. The block shown gives good results, but do not be afraid to change it to suit local conditions, or your own adjustments.

Cover all components, including prop blades, with light tissue, preferably Japanese. Watershrink surfaces, then apply two coats of thin clear dope, then two coats of dye dope. I used dope from Best by Test Models of Ridgefield, N. J., or Aerogloss translucent dopes. Assemble Wakefield with motor in place, and locate CG. Cement pylon in place so that CG of completed model is 1/2 in. ahead of the TE. Add AMA numbers and identification label and you're all done.

Before attempting any flights, check wing and stab for warps. Stab and the wing center panels should be perfectly true. The wing should have about 3/16 in. washout at the tips, which will be built in if the ribs are cut as described. The important thing is to have both halves the same. Assemble model and hand glide, checking for any severe turn, or stalling or gliding tendency. Since each model must be adjusted differently, I will include a few notes about each.

Wakefield:

Power should be 14 strands of 1/4 x 1/24 Pirelli, 34 in. long, or equivalent. This can be obtained from Ed Dolby, 25 Exchange St., Rockland, Mass., if not available locally. Prewind carefully to 650 turns before using in model. I have always used castor oil for lube, and have never had trouble. If you have a pet concoction, use it; if not, try castor.

Add one paper matchstick to the upper left side of the noseblock. Hand wind approximately 100 turns and launch. Observe flight pattern carefully; turn under power should be right with right or left glide. Correct power stalls with a combination of down and right thrust, and the glide by changing stab in-

cidence. Add packing of matchbook cover under stab LE to cure stall and under trailing edge if model dives. If this doesn't cure trouble, check incidence angles and CG position. When flights on hand turns look okay, start putting on winder turns, increasing 50 turns on the motor each flight. Adjust glide circle for about 100 ft. diameter with trim tab and stab tilt. With 650 turns on the motor prop, run is 50-55 secs, and dead air total time more than 180 secs.

PAA-Load

Use a 7.3 or 7.4 prop backward for first flights with 8-10 second motor run. Start with low power and increase each flight, adding down and right thrust to cure power stalls. If everything looks okay, turn prop around and start again with low power. Final trim should result in right spiral climb with the nose really up. Right-right pattern seems to work best and glide circle should be fairly small. Always fly with the dummy and cargo in place. With 20 second ROG dead air time should be 2-1/2 minutes.

Hi-Thrust

Start tests same as PAA model, and adjust thrust line for a straight fast climb very steeply without excessive forward speed. Try for one circle in 15 secs. ROG with right-right pattern. VTO is no problem. Just hold model aft of the pylon, place on ground and let go. In dead air launch in vertical position, and when windy, at a lower angle. A little practice will show you the best method. With 15 secs. ROG time should be 3-1/2 minutes in dead air.

I recommend testing in calm air until you are familiar with the ship, then test further in windy weather. Practice ROG's until you are not worried about this crucial point. There is no use in attempting flights if you can't take off. Take your time and think out each adjustment before you make it. I would appreciate hearing from anyone interested in this design. END

Contest Calendar

MAY

1—*Tucson, Ariz.:* Class AAA 4th Annual Tucson Round-up for FFG, OR, TLG, OHLG, CLS, CL, combat, CLFS, RC. Charles R. Downs, C.D., 1035 E. 6th St., Tucson, Ariz.

1—*Seattle, Wash.:* Class AAA Northwest Regional Model Aviation Meet. For information, contact N. Harry Martin, Jr., 8311 23rd, N.W., Seattle, Wash. Pending.

1—*East Paterson, N. J.:* Class A Elmwood Model Airplane Meet for combat, CLS, TR, beauty. Entry is restricted to residents of Bergen & Passaic Cos. S. Gilbert Evans, C.D., 600 Beech Ave., Fairlawn, N. J. Pending.

8—*Ft. Worth, Tex.:* Cowtown Sahibs' Record Trials for all outdoor classes. Similar Record Trials also on June 12, July 10, Aug. 14, Sept. 11, Oct. 9, Nov. 13, Dec. 11. Ralph Tenny, C.D., 2409 Spiller, Ft. Worth, Tex.

8—*Santa Ynez, Calif.:* Class AA 3rd Annual Omnimeet for FFG, OR, TLG. Wm. J. Kaupp, Jr., C.D., 2733 Verde Vista, Santa Barbara, Calif.

8—*Harvey, Ill.:* Class A RC^3 Flying Meet. Entry is restricted to members of the Radio Control Club of Chicago. Similar meets also on June 19, July 24, Aug. 28, Oct. 2. R. E. Webb, C.D., 1303 W. 79th St., Chicago 20.

14—June 5—The International Competition Elimination Contests to qualify for team positions for the World Championship Wakefield Rubber, FAI Power and Nordic Glider Contests will be held in approximately 30 areas throughout the country on week-ends within this time period. Since we are unable to list the exact sites or contest directors of these Eliminations

at time of writing, you should immediately contact the nearest member of the AMA International Competition Committee for this information. Members of the ICC are: William Fletcher, Chairman, 86-36 55th Ave., Elmhurst 73, N. Y.; Ed Dolby, 25 Exchange St., Rockland, Mass.; Pete Sotich, 3851 W. 62nd Pl., Chicago 29; Joe Bilgri, 256½ Locust St., San Jose, Calif.

15—*San Diego, Calif.:* Class AA San Diego Aeroneers' Annual PAA-Load Contest for PL and CC. George G. Wagner, Sr., C.D., 924 Evans Ave., Chula Vista, Calif.

15—*Arcadia, Calif.:* Class AA Team Racing Contest. Similar contests also on Aug. 14, Oct. 9, Dec. 11. Les McBrayer, C.D., 1238½ So. 2nd St., Alhambra, Calif.

15—*Kirkwood, Mo.:* Airvaleers' Record Trials for CL. W. F. Netzeband, C.D., 955 Blase Dr., St. Louis 22, Mo. Pending.

21—*New York City:* Class AAA 10th Annual Mirror Model Flying Fair for CL, combat, TR, CLS, NC, FFG, PL, RC, CLFS, beauty, CC, helicopter. Ted Clodius, C.D., New York Mirror, 235 E. 45th St., New York 17, N. Y.

21 & 22—*Moffett Field, Calif.:* Class AAA 1955 California Model Airplane Championships for CL, CLS, FFG, OHLG, IHLG, IR, RC, combat, CLFS, NC, TLG, OR. H. S. Robbers, Sr., C.D., 5610 East 17th St., Oakland 21, Calif.

29—*Bristol, Pa.:* Class AA 5th Annual Flying Circus for NC, CLS, combat, TR, CLFS, OHLG. Albert E. Abrams, Jr., C.D., 1031 Pond St., Bristol, Pa.

29—*Fresno, Calif.:* Fresno Gas Model Record Trials for FFG. Similar Record Trials also on June 26, July 31, Aug. 28, Sept. 25, Oct. 30, Nov. 27, Dec. 26. Jim Scheidt, C.D., 2225 Brown Ave., Fresno, Calif.

29—*San Diego, Calif.:* Class AAA Uptown Exchange Club & San Diego Model Clubs Meet for FFG, OHLG, RC, CL, combat. James Saftig, C.D., 1560 Froude St., San Diego 7, Calif.

30—*Galesburg, Ill.:* Class AA Memorial Day U-Control Contest for TR, CLFS, CL, combat. Kenneth W. Freese, C.D., 90 Olive St., Galesburg, Ill.

JUNE

4 & 5—*Goodland, Kan.:* Class AA Northwest Kansas Gashoppers' Meet for FFG, CLFS, CLS, combat, RC, CL. Kenneth Armstrong, C.D., Goodland, Kan.

4 & 5—*Nashville, Tenn.:* Class AA 4th Annual Model Aircraft Show. Carl V. Miller, C.D., 427 Deaderick St., Nashville, Tenn.

5—*Farmingdale, N. Y.:* Class AA 2nd Annual Long Island Industrial Championships for CL, CLS, combat, NC, beauty. Arthur F. Wardell, C.D., 2 Hunt Pl., Bethpage, N. Y

5—*El Paso, Tex.:* Record Trials for FFG, OR, TLG, OHLG. Similar Record Trials also on Sept. 10, Dec. 4. Fred Lind, C.D., 1610 E. Yardell, El Paso, Tex.

5—*Fall River, Mass.:* Controlline Meet. David P. Turner, C.D., 422 S. Main St., Fall River, Mass. Pending.

5—*Chicago:* Class AA Chicago U-Liners' Annual Meet for combat. Edgar M. Holzbach, C.D., 14510 S. Union Ave., Chicago 27.

5—*Wilmington, Del.:* Class AA Meet. W. Lewis Knowles, C.D., 515 Shipley St., Wilmington, Del. Pending.

5—*Los Alamitos, Calif.:* Inglewood Flightmasters' Monthly Record Trials for FFG, TLG, OR. Robert E. Moncrieff, C.D., 2108 Santa Fe Ave., Torrance, Calif.

12—*Ft. Wayne, Ind.:* Class AA Mad Modelers' Meet for FFG, CLS, combat, CLFS, RC. Walter A. Krull, C.D., 414 E. Washington, Ft. Wayne 2, Ind.

12—*Corning, N. Y.:* Class AA 2nd Annual

Flying Sparks' Radio Control Meet. W. E. Bliss, C.D., 47 Corning Blvd., Corning, N. Y.

12–*Inglewood, Calif.:* Class AA Skywolves' Team Race. Similar meets also on July 10, Sept. 11, Nov. 13. Don C. Crystal, C.D., 805 E. Palmer Ave., Compton, Calif.

12–*Easton, Pa.:* Class AA Model Airplane Doctors' 3rd Annual Air Meet for FFG, combat, OR, CLS, RC, TLG, CL. Russ R. Sottosanti, C.D., 113 Keane St., Easton, Pa.

12–*Hartford, Conn.:* Class AA Greater Hartford Spring Team Race. Richard Matava, C.D., 358 Prospect Ave., Hartford, Conn.

12–*Cedar Rapids, Ia.:* Paul M. Marchal, Jr., C.D., 1837 8th Ave., S. W., Cedar Rapids, Ia. Pending.

16-19–*Atlanta, Ga.:* Class AAA Greater Southeastern Model Airplane Contest for FFG, CL, OR, OHLG, CLS, CLFS, RC, TR, NC. Lloyd Wason, C.D., 315 Church St., Decatur, Ga.

18-19–*Stanley, Kan.:* Class AAA KC/RC Assn. Midsummer Meet for RC. Len Marshall, C.D., 9115 E. 67th St., Kansas City 29, Mo.

19–*Long Island, N. Y.:* Class AA Skyscrapers' 11th Annual Free Flight Contest for FFG, OHLG, OR, TLG. Joseph Scuto, C.D., 7023 11th Ave., Brooklyn 28, N. Y. Pending.

19–*Strongsville, O.:* Class AA Lakewood Flite-Masters' First Annual Free Flight Meet for FFG. Donald R. Cowgill, C. D., 1567 Wyandotte Ave., Lakewood 7, O.

19–*Los Alamitos, Calif.:* Class AA Long Beach Thunderbugs' PAA-Load Contest for PL, CC. F. L. Swaney, C.D., 527 E. 55th St., Long Beach, Calif.

19–*St. Clair Shores, Mich.:* Class AA Emerald Harbor City Air Fair for combat, CLS, CLFS, CL. Howard A. Lewis, C.D., 21520 California, St. Clair Shores, Mich.

25-26–*Detroit, Mich.:* Class AAA Great Lakes Radio Control Meet. (To be held in conjunction with Michigan State Exchange Clubs' Meet.)

26–*Kansas City, Mo.:* Class AAA Flying Fools' 3rd Annual Controlline Contest for CLS, combat, CL, TR. Peter W. Asjes, C.D., 5313 Ralston, Kansas City 29, Mo.

26–*Mankato, Minn.:* Class AAA Mankato Exchange Club Model Airplane Meet for FFG, CL, CLS, TLG, combat, CLFS, TR, RC. William B. Thomas, C.D., Box 713, Lake Crystal, Minn.

26–*Detroit, Mich.:* Class AAA Annual Michigan State Exchange Clubs Model Airplane Meet for FFG, CL, OR, TLG, CLS, RC, PL. Entry is restricted to residents of Mich. Frank P. Sposite, C.D., 9900 E. Jefferson, Detroit 14, Mich.

26–*Collegeville, Pa.:* Class AA Cross Key Hawks 1st Annual Controlline Meet for TR, CL, combat, CLS. George Moir, C.D., Main St., Mantua, N. J.

26–*Wallingford, Conn.:* Class AA Lufbery Circleers Team Race. Chester A. Orrill, Jr., C.D., 47 Carpenter Ave., Meriden, Conn.

26–*Lakewood, O.:* Class AA Free Flight Contest. D. R. Cowgill, C.D., 1567 Wyandotte Ave., Lakewood 7, O.

26–*Millville, N. J.:* Class AA Garden State Aeronauts' June Meet for FFG, CLS, RC, TR, combat, CLFS. Andrew Canino, C.D., 116 Quince St., Vineland, N. J. Pending.

JULY

2 & 3–*Houston, Tex.:* Class AAA Meet for FFG, CL, CLS, combat, PL. Robert R. Osburn, C.D., 902 17th Ave. N., Texas City, Tex.

2 & 3–*Amarillo, Tex.:* Class AAA Globe News 3rd Annual Model Airplane Meet. James F. Pierce, C.D., 2607 W. 22nd, Amarillo, Tex. Pending.

3–*Chicago:* Class AA 3rd Annual Chicago

Prop Nutz Flying Meet for FFG, OHLG, TLG, OR. Peter J. Sotich, C.D., 3851 W. 62nd Pl., Chicago 29.

3—*Lancaster, O.:* Class AA Lancaster Skylarks Club Meet for CL, CLS, combat. Paul McGrew, C.D., 331 E. Main St., Lancaster, O.

10—*Joliet, Ill.:* Exchange Club of Joliet Flying Circus. Glenn F. Stearman, C.D., 604 Abe St., Joliet, Ill. Pending.

10—*Lancaster, O.:* Paul McGrew, C.D., 331 East Main St., Lancaster, O. Pending.

10—*Pittsfield, Mass.:* Class AA 4th Annual Berkshire Model Plane Contest for CLS, combat, TR. Robert L. Elliott, C.D., 48 Curtis Terr., Pittsfield, Mass.

10—*Long Island, N. Y.:* Class AAA Gas Monkeys' 8th Annual Long Island Championships for FFG, jetex, OR, RC. Edwin W. Howe, C.D., 5 Camdike St., Valley Stream, N. Y.

10—*Orangeburg, S. C.:* Class AAA 1st Palmetto Regional Championships for FFG, CL, TLG, OHLG, CLS, CLFS, RC. Larry Bly, Jr., C.D., P. O. Box 744, Orangeburg, S. C.

11-16—*Travis AFB, Calif.:* Air Force World-Wide Championships. Entry is restricted to qualifying Air Force personnel.

17—*Hartford, Conn.:* Class AA Insurance City Team Racing Meet. Charles J. Gallagher, C.D., 47 Church St., East Hartford, Conn.

17—*Kohler, Wis.:* Class AA Annual Free Flight Meet for FFG, OHLG, TLG, FFFS, and RC. Wilbur A. Lea, C.D., 1030 No. 14th, Sheboygan, Wis.

18-24—*Los Alamitos, Calif.:* Class AAAA National Championship Model Airplane Contest.

24—*Milwaukee, Wis.:* Class AA Milwaukee Flying Electrons' 4th Annual Flyspiel Meet for RC. Victor R. Weissbrodt, C.D., 2100 E. Webster Pl., Milwaukee, Wis.

KEY TO LISTING OF EVENTS: FFG—Free Flight Gas; CL—Controlline Speed; OR—Outdoor Ruuber; TLG—Towline Glider; IR — Indoor Rubber; OHLG — Outdoor Hand-Launched Glider; IHLG — Indoor Hand-Launched Glider; CLS—Controlline Precision (Stunt); CLFS—Controlline Flying Scale; RC—Radio Control; TR—Team Racing; FFFS—Free Flight Flying Scale; PL—PAA-Load; CC—PAA Clipper Cargo; NC—Navy Carrier.

Contests designated "Pending" mean the application is before the proper authorities as we go to press; "Record Trials" mean no prizes, but a chance at cracking the records; "Class A" is a meet with restricted entry; "Class AA" is a meet with unrestricted entry; "Class AAA" is a state-wide or regional meet; "Class AAAA" is a national or international meet. END

How to Cover with Silk

(*Continued from page 12*)

The Nordic A.2 International class towliner, of course, has to weigh 14-1/2 oz. for a maximum total surface area of 525 sq. in. Again, a silked wing can be used well within this weight limit.

Silk, needless to say, is a lot stronger than paper. Properly applied, it will give considerable strength and ridigity to a frame, yet it is resilient and will withstand an impact better than paper. Also, when it is punctured, silk is much less likely to split.

After all this, what are the snags? Actually, apart from the fact that silk is a good deal more expensive, there are no serious disadvantages. For quick and easy results, silk needs to be applied wet and, without an extra couple of coats of dope, it will not have quite such a smooth shiny surface as a good lightweight tissue, but these are, we think, more than outweighed by its advantages.

To deal now with our picture sequence: 1. As with any kind of covering, the first thing to do is to check the frame to be covered, mak-

ing sure that all joints are secure and that there is nothing left undone. Then go over the entire surface with a fine sandpaper block, removing any blobs of cement and smoothing out any roughness. Incidentally, cap-stripping wing-ribs, as shown, is well worth while where slight extra weight can be tolerated.

2. There are two main types of adhesive for silk covering. The usual type is a dope and cement mixture. Dope or cement alone is not suitable, but mixed together they give just about the right consistency and drying rate. An alternative is Kodak photo paste. This type of adhesive has been used in Britain since the earliest days of silk-covered balsa gas models. It is very well suited to the wet silk method of covering since the dampness of the silk keeps the paste tacky and enables the silk to be continually pulled over the woodwork until it is smoothly and evenly applied. It is, we would say, easier to work with than the dope-cement mix and, if you have not previously worked with the latter, we suggest you give photo paste a try.

3. A raw balsa surface is too porous to take adhesive satisfactorily. Both cement-dope mixtures and photo paste tend to soak into the wood too easily and to raise the grain, causing roughness. It is advisable, therefore, to pre-dope the frame after sanding. Just apply a coat of ordinary clear dope over the entire framework; then, when dry, lightly dust over the surface with fine sandpaper to remove any slight roughness.

4. The maximum shrinkage of silk is with the "grain." Therefore, as a general rule, grain should run lengthwise. On a wing, this will insure that there is no undue sag between the ribs. On a fuselage, it will insure that the tendency to pull in the longerons or stringers will be reduced. Lay the component to be covered on the silk and cut around it with sharp scissors, leaving 1/2 in. or so margin around the outside.

5. Silk can be applied dry or wet. We favor the wet method. When wet, silk, like other model covering materials, expands somewhat, then shrinks again as it dries. Therefore, by applying the silk wet—and thus in an "expanded" condition—we insure that it will draw up tightly over the framework when it dries. This means that the dope will have less work to do and a wrinkle-free covering is virtually assured. Fold or roll up the silk neatly and immerse it in a basin of clean water, pressing it with the fingers to insure that it is thoroughly saturated.

6. Remove the silk from the bowl and gently squeeze out surplus water. Straighten out and hang up by one side.

7. Now apply adhesive to the framework. Apply to the widest areas first: *i.e.,* unless the leading edge of a wing is sheeted, the narrow leading edge should be treated last. Do not use adhesive on ribs, except in the case of the bottom surface of an *undercambered* wing. For this latter, cellulose cement should be used or (our choice) a good strong waterproof cement. Since cement dries quickly, this, if used, must be applied last, so that it does not dry out before the covering has had a chance to stick to the ribs. (Adhesive on the top surface of the ribs, or on a flat or convex under-surface, is not necessary because subsequent doping is sufficient to cause the material to stick to the ribs. Prior treatment of undercambered wings is necessary because the shrinkage of the covering tends to pull it away from the ribs.)

8. With the framework properly covered with adhesive, take up the piece of wet silk by the two ends and carefully lay it squarely on the frame so that it overlaps the edges evenly.

9. Now grip the two ends of the silk again and pull out so that the material is stretched lengthwise over the frame. Press the silk down onto the adhesive at the ends on the frame-

(*Continued on page* 50)

work. Then pull the fabric across the frame at the center, working outward toward the ends. Watch the grain of the silk: it should stay parallel and will soon show you if you are pulling unevenly. If you are using photo paste, you will find that you can constantly lift and re-stick the silk until you have it fixed evenly and without wrinkles.

10. When you are quite satisfied with your efforts, run a brush loaded with dope around the edge of the frame, just inside where you will trim off the surplus, and press the silk down. This has a dual purpose. Firstly, it prevents the silk from fraying during the trimming and, secondly, if you have been using paste, it enables you safely to trim the silk while the covering and paste are still damp.

11. To trim off the surplus silk, just run a *sharp* razor blade around the edge, holding the surplus strip taut as shown. The blade must be really sharp and its edge should be kept clean.

12. One of the big attractions of silk, especially when applied wet, is that it can be pulled over surfaces with a double curvature without wrinkling. You will find this especially valuable with curved and streamlined fuselages. A wing tip is a very simple matter.

13. Opinions differ on whether edges should be overlapped or not. On a wing, we generally trim flush with the trailing edge, but lap the top surface over the bottom by about 1/8 in. at the leading edge.

14. To complete your covering job, it is necessary to make sure that all the edges of the silk are properly sealed down. Go around it, therefore, with the dope brush again, pressing down the edges of the silk with the fingertips.

15. By this time, your covering will be drying out and becoming taut over the frame. Unless you have a very weak frame or the silk has been unevenly fitted, however, there is no danger of warping during this first shrinking and the component can be laid aside to dry out completely.

16. When the unit is completely dry—*and not before*—it can be doped. It is essential to pin down a wing or tail surface while the dope is drying. Before starting to dope, therefore, make sure that you have a suitable flat board, some scraps of 1/8 in. sheet balsa and some pins handy. Then dope the underside.

17. Pin the surface down, placing pieces of 1/8 in. balsa under the edges to prevent the doped underside from touching the surface of the board. Pin down firmly. Next, dope the top surface.

18. Leave the wing or tail secured to the board just as long as you can. Normally, silk will require three coats of dope to guarantee airproofing. Follow the same procedure each time you apply a fresh coat and, if you can leave the surface pinned down for several days, so much the better. Covered flying surfaces invariably take a little time to get "acclimatized" and if you remove the wing or tail from the board just as soon as it is dry, the chances are that, after a day or two, a warp will appear. Plasticizing the last coat with a few drops of castor oil is advisable if the covering appears to be pulling too tightly.

In conclusion, just a few "don'ts" about silk covering. Firstly, regarding the substitution of silk for paper covering, don't use silk on a flimsy framework: it is likely, when doped, to produce a "scalloped" effect on longerons, leading edges, etc., through its greater "pull" when contracted. Closer spacing of ribs or cross-members, or the use of heavier longerons or a sheeted leading edge, will prevent this.

Secondly, never dope a partly covered frame. Cover every part of it and then dope the entire unit. If you cover and dope piecemeal, you are almost certainly asking for a warped component.

Thirdly, if, later, you have to repair or patch your silk covering, use thickened dope, not photo paste, as an adhesive. If you tear a hole in the fuselage, for instance, cut the silk back to the bordering woodwork, coat the edges of the frame with thick dope and apply a new silk panel wet. When dry, dope in the usual way. END

LET 'ER RIP!

Proportional Beep Box

(Continued from page 31)

3/32 in. O.D. brass tubing. Use a couple of washers between the wheel and the side frame with the 1/4 in. hole. Mount the motor with a 2-56 screw and three nuts as shown. Adjust the nuts so the motor pivots without having too much slop. Make a coil spring from .010 music wire and attach to the motor and side frame. This spring is not critical since only a small amount of tension is needed. Also slip a piece of rubber or plastic fuel tubing over the motor shaft. Rubber is preferred as it will help absorb any eccentricity of the wheel.

The stick is cut from a 5-1/2 in. long piece of 1/4 in. dowel. Drill a 1/8 in. hole in the location indicated and insert a 7/8 in. length of 1/8 in. O.D. tubing as shown. Do not mount the spring contact point as yet since its exact location will be determined later. Bend the centering spring to shape from .040 music wire. Mount the stick and centering spring to the side frame next to the contact plate with a 1-3/8 in. length of 3/32 in. O.D. brass tubing. Next, cut a 1/4 x 1/2 in. spring stop from 3/32 in. plywood and bevel the two long edges. Mount the stop to the side frame with a 2-56 screw and nut and adjust the stop if necessary, by enlarging the hole, to bring the stick perpendicular to the top edge of the side frame when the stick is in neutral. The stick should snap back to the same spot each time it is deflected and released. Adjust the spring and stop until this action is obtained.

Bend the contact point from a piece of 3/16 x 2 in. shim stock or thin brass. Spring-tempered brass is not necessary since the contact point flexes only a little. Trim one end to a 1/16 in. wide point and round off all the edges. Mount the contact point to the stick by cementing and wrapping with thread. Before the cement dries, adjust the contact point so it covers the neutral point on the contact plate when the center line through the neutral point is perpendicular to the stick. When dry, solder the other end of the contact point to the 1/8 in. tubing that passes through the stick. If full "on" signal is desired, it will be necessary to notch the control stick a bit to clear the wheel shaft.

The pulse unit, motor batteries, pot and switch are all mounted as shown in a 4-3/4 x 3-3/4 x 3 in. box built up from hard 3/16 in. balsa. The top and bottom ends of the box are 1/16 in. plywood and in the original the bottom was removable for battery replacement. The lead to the transmitter was brought out the bottom and was about 6 ft. long. A DPST switch was used to cut the power to the motor and transmitter simultaneously. The builder may prefer to add a push button for keying the transmitter separately. A 10 ohm wire wound pot (Mallory M10R) was used to adjust the pulse rate but a 25 ohm pot will do. The pulse unit can be mounted to one side of the box by three 1/8 in. spacers and 4-40 screws. The location for these holes on the side frame is shown by a "X" in the three view. The author flies with signal off as right rudder and the arrangement of the components as shown has been set up for this condition. The slot in the top of the box for the stick is cut so its length will restrict the stick movement at the end of contact point travel. When connecting the batteries to the motor, use the polarity that will drive the wheel counterclockwise when facing the side of the wheel with the contact plate. A Pittman motor was used in this box but any of the small plastic motors on the market will do. With these motors it will be necessary to make a small mounting bracket for the motor to pivot on and possibly a small extension to the motor shaft.

An alternate way to construct the wheel and heart-shaped contact plate is to use a piece of 1/8 in. thick copper clad printed circuit material. Simply inscribe the heart-shaped pat-

(Continued on page 52)

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tern on the cut out wheel with a sharp knife and then peel off the copper from around the pattern. Smooth down the edges with emery cloth and the wheel is finished except for soldering the shaft in place. Only a small amount of pressure is required on contact point to make good contact with the plate, so wear is very slight.

The author hopes that this control box will enable more modelers to enjoy the pleasure of flying their ships with proportional control. Probably one reason some modelers shy away from this type of control is its lack of the so-called fail-safe feature. The author believes that fail-safe control systems have been over-emphasized, especially to beginners. He would much rather have his ship pile in then to free-flight out of sight never to be found again. A flyaway is hard on the pocketbook while the majority of crack-ups only involve the cement pot and some scrap wood. Proportional pulse control is not restricted to planes but can be used in cars as well as boats. END

The Veto

(*Continued* from *page* 14)

of the new type of take-off, because it is very different from a conventional take-off. Once in the air you can fly the ship the same as any other hot stunt ship.

When you are ready to land the ship, relax and take your time; pull the third line and wait for your engine to slow down; then snap the ship into a stall of about 75 to 80°; the ship should start to descend at an angle of about 75° to the ground. When the ship is from 1 to 2 ft. from the ground, pull the nose up to 90°. The ship should fall the last foot and land vertically. (The word "fall" does not mean a fast drop but only a slight increase in downward speed through less lift from the wings.) Don't worry about it if you are not completely successful on the first try, for your choke may need some adjustment, and you will be doing something that very few people have done up to now.

I would suggest that, if you live in a low altitude, you use a .19 to .25 engine; it will pull the ship very well, and the large wing area will allow it to stunt and fly at fairly slow speeds. If you live in a high altitude, you should use a .25 to .35 engine. The flier should use a 10-5 or 10-6 prop (but no greater pitch than 6 in.) with a wide blade. This enables the engine to hold the ship in a slow stall while it descends.

The flying lines should be 52 or 60 ft. lines, depending upon the length with which you generally fly. The airplane will fly in a light wind, but should be test flown in dead calm air. If you are flying a slight wind, or if a wind comes up while you are flying, and you wish to land the plane, start the stall downwind, and obtain it fully by the time you are heading into the wind. The wind actually helps make the landing because the ship will be pushed to a 90° angle by the wind on the wings.

Note: Try not to fly in wind until you have flown the ship several times in calm weather. If the air is gusty, you should not fly the airplane, but if you happen to do so, be sure to take off downwind and land directly downwind.

The ship in the picture is not the original Veto, but a second revised model, with a few changes, including a wider trailing edge, larger stabilizer and elevator, and a slightly shorter nose for better stunting and landing qualities. This airplane has approximately 15 coats of Aerogloss (Fokker red with black trim), a bubble canopy from a Berkeley P-47 Thunderbolt, a 2.5 oz. tank and a Fox .25 engine.

The wing of this airplane should be built first and should be built very rigidly, because it takes up most of the shock of landing; the tips are of 1/8 in. plywood, as are the rud-

ders. The rudders are to balance the ship, taking up very little of the shock of landing.

The stabilizer tips do not touch the ground but serve appearance only—they do not help in the take-off or landing.

The construction of this airplane is designed to take the shock of a pretty hard landing, even though it is not expected to need all of this strength because the engine will let it land quite easily.

I don't expect any novice flier to attempt to fly this plane, as it is a very hot stunter and even an experienced flier will need some time to get the hang of the landings and take-offs. END

Pen Pals

▸ All you scale fans looking for high intrigue can offer your aero-detecting powers to Robert F. Dorr, 2502 Gaither St., S.E., Washington 21, D.C., who seeks photographs and specifications of the North American P-64 (NA-50), made for Siam in 1942, later used experimentally by the Air Force, whose existence is now mysteriously denied by all logical sources of data . . . Aeromodeller plans will be exchanged for those printed in MAN by Derek J. Haslett, 24 Addison Rd., Hove 2, Sussex, England . . . Victor Grayson, Fyansford P.O., Via Geelong, Victoria, Australia, 17, wants to hear from fellow modelers with special interest in controlline, stunt, combat, scale, FF scale . . . Swap magazines with FF fan Robert Pettifer, 6 Newent Rd., Northfield, Birmingham 31, England, 14 . . . Anthony Seibert, American Consulate General, Amsterdam, Holland, wants to sell unused OS .099, "almost new" Fox .29 and old Fox .35 . . . And another request for out-of-print Wylam Book I. Write Bill Gebhard, 228 E. Rosedale Ave., Milwaukee 7, Wis., who is also hunting Maircraft and old Hawk plans, 1/4 to 1 in. . . . Can you help these readers find out-of-stock back issues of MAN? H. Lee Kirby, 3100 N. Fifth St., Arlington, Va., needs MAN for October, 1946; October, 1951 issue wanted by both Bill Donald, 926 N. Madison, El Dorado, Ark. and Joseph P. Cairo, 6716 Cornelius St., Philadelphia 38, Pa. END

MAN at Work

(*Continued from page 6*)

Some of the biggest meets in the land are run in Cleveland; June 12, 19, July 10-17, Sept. 25 coming up. Drop Chuck a line at the Cleveland Press.

• • •

▸ Capitol Aeroneers, Austin, Tex., sponsored by Exchange to further the Exchange youth development program. Training sessions with tutors like stunt champion George Aldrich. Meetings first, third Mondays, local YMCA, who put club rooms, shops, kitchen, at club disposal. Flying Zilker Park. Write Robert Schmidt, 1700 W. 31st St., Austin, Tex. . . . Aero-Craftsmen Gas Model Club (W. L. Rhodes, 8419 Oakleigh Rd., Baltimore, Md.) obtained tract of land from Baltimore Bureau of Parks. Lots of indoor ROG's in winter . . . St. Louis County Modelers Assn. (Walter Platte, 2127 67th St., St. Louis, Mo.), encourages new and young members, welcomes other club affiliations . . . New club: Bill Wiese, 400 Collinsville, E. St. Louis, Ill. . . . Can you beat this: Galesburg, Ill. Exchange approached model club asking if they would like to be sponsored. (Ken Freese, 90 Olive, Galesburg, Ill.)

• • •

▸ Wakefield and FAI: Armed Forces sponsorship; will fly members to West Germany for finals. Most local eliminations on AF bases, May 21-22. If conflict with big regional meets, June 4-5. Regional fly-offs, third week June. Info your area, Joe Bilgri, 256-1/2 Locust St., San Jose, Calif.; Pete Sotich, 3851 W. 62nd Place, Chicago; Ed Dolby, 25 Exchange St., Rockland, Mass. . . . PAA-Load rules book correction: American class dummy

weighs 4 oz., but total payload is 5 oz. Internationals Class is 8 oz. dummy, plus 8 oz. cargo; also, "total flying weight of not less than 7 lb." should read "not more . . ." . . . Fresno Model News (Ocie Randall, 716 Waterman Ave., Fresno 6, Calif.) up to Vol. 14, No. 9. Imagine! . . . Oregon Aeromodelers Assn. Digest (Earl Cayton, 879 N. Liberty, Salem, Ore.) describes Corvallis Club endurance records on Half-A, 25-ft. line and ROG, 6 oz. load. Heinz Brandt flew 41 minutes. On pure load lifting, John Riley got off with 29 oz. . . . Ridgewood Train Center, Ridgewood, N. J., offers 2-1/2 hour trip to any customer buying $15 or more merchandise, including tour of shop and a free ride in Cessna 180 at local airport . . . Prop Twisters Model Club, 119 N. Greene St., Greensboro, N. C., club paper called Slip Stream . . . Need ducted fans? Tom Purcell, the guy who started all this, still has 'em. Box 5443, State College Station, Raleigh, N. C. . . . Did we say Joe Wagner, formerly with Veco, now designing for Ken-Hi? Their new Mustang controlliner has a nice picture sequence on construction, covering reverse side of plan . . . Gil Henry says those wonderful little Dakotas are still available. END

Flash News

(*Continued from page* 4)

from 25 per cent of gross weight to 40 per cent when Mach 1 is reached, over 60 per cent when Mach 1.5 is flown. Is it more speed, bigger planes?

Link builds a new pilot trainer. Flight Safety, trainer of airline and business pilots, gets the first twin-engine, two-plane procedure and navigational flight trainer sold for commercial use. Testers say, "It's a honey, almost talks back." But its use will be mostly advanced training, with its DC computor system, complete radio facilities and controls needed to set up a training flight "anywhere."

Coptor development seems to be accelerating, or perhaps new ones are coming out, as new cars did after the turn of the year. Remote control jobs are not too far off. Kaman Aircraft is evaluating one for Navy at Bloomfield, Conn. The "drone" is basically a Kaman HTK-1 modified so a ground control station can operate it. But all flights so far have been limited to an operator's visual range. Even so, it can be made to take-off, hover, go backward, forward, sideways.

Bell is working on a new utility helicopter for Army. The 212 will carry an 800 lb. payload, cruise at 100 knots, have hovering ceiling of 6,000 ft. and 1,500 fpm rate of climb.

Blind flying in 'copters is probably further advanced than security permits describing. The fact that Bell's 212 will be used for instrument training is a clear sign of the speed of developments in blind flying methods in helicopters.

Better than a phone call from Moscow is the Super Connie radar plane that will patrol the North Atlantic on round-the-clock sentinel duty. A 30-man crew will live in virtual hotel comfort in the pressurized, soundproof cabin, operating the more than 5-1/2-tons of radar and electronic gear. Wing-tip fuel tanks will permit a 24 hour patrol at 300 mph.

From the "hush-hush" files: Alaska, above the Arctic Circle, will be surveyed this Summer by the Army. They're curious about the 86,000 square miles (bigger than all the New England States) never before properly mapped. About 50 helicopters will be used, 1,400 men.

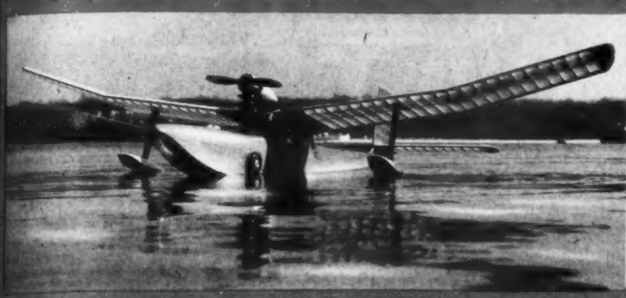
Another part of the far North also gets more aviation work. Canada will use a huge airlift to map sites for DEWline (distant early warning) across Canada's Arctic Circle. Radar warning stations will be placed where only dog teams have hitherto penetrated.

The Arctic Survival School must be plenty tough. An avid reader of this column writes: "I am a full-fledged graduate; three days in classroom, 2-1/2-days in the woods. As for the latter, fortunately it was warm—only 23° below zero. My colleagues josh me that I took the Summer course." Equipment is a parachute, machete, two candles, matches, a can, a tin cup, sleeping bag and "obsolete rations." The reader avows he proved he could survive, but adds "give me a warm kitchen anytime."

Congress' half-billion dollar aviation hassle may last some time. It's the argument over *Tacan* (Tactical Air Navigation) that Defense wants used versus the VOR-DME system (VHF omniranges and distance measuring equipment). The latter is referred to as "the common system." About $300-million has probably been spent on *Tacan*, even more on VOR-DME. Most of private aviation favors sticking to the latter. Many of the arguments are to the effect that neither is compatible—one or the other must be junked. Informed technical opinion is that a compromise can be reached using some parts of each "if all hands are reasonable about the matter."

What aviation writers are gossiping about in Washington, D. C.: Britain won't use America's *Nike* anti-aircraft missile—just not suited to British defense . . . Navy and Atomic Energy have an Operation Skyhook scheduled this Summer, sending high altitude balloons above 100,000 ft. to learn more about cosmic rays and high energy particles from outer space . . . Canadian Pacific Airlines to schedule flights over the North Pole—Vancouver, B. C. to Amsterdam in 18-1/2 hrs. . . . Kudos to CAA's Av Info for series of "profiles" about the fellows who really make the service's service tick . . . Business planes flying almost twice the miles of the scheduled airlines . . . Sending guided missiles behind the Iron and Bamboo Curtains to obtain photos of bomber bases; bringing them back to "safe" territory for parachute recovery. END

CONTEST FLYING TIME IS HERE!



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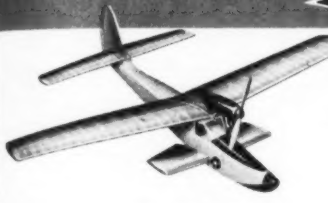
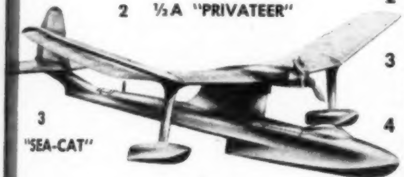


2 ½A "PRIVATEER"



3 "SEA-CAT"

4 AMAZON "400"

5 "PAYEE"

6 "MINI-HOGAN 34"

7 "SANDY HOGAN"

1 **"CUSTOM PRIVATEER" R.C. Amphibian $19.95**
For .45 to 1.20 Engines — 114" Wingspan
Free-Flight or R.C. Long Planing Hull, Ring Cowl

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For .035 to .074 Engines — 36" Wingspan
N.A.C.A. Long Planing Hull will R.O.W. in 15'

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For .14 to .24 Engines — 62" Wingspan
Tremendous climb and glide, contest proven

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For .035 to .074 Engines — 34" Wingspan
Easy to build, a threat at every contest.

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For .29 to .35 Engines — 70" Wingspan
Warp resistant structure, enviable contest record

8 **"SUPER CLOUD" Wakefield Design $3.95**
Rubber Powered — 51" Wingspan — 8.113 oz.
Milled Balsa Prop Blank, Folder Hardware etc.

9 **BOOTSTRAPS "A-RC" R.C., Free-Flight, PAA-Load $4.95**
.09 to .14 Engines — 54" Wingspan
Clip in prone engine mount and R.C. chassis

10 **"ROYAL RUDDER-BUG" Radio Controlled $6.95**
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Designed by Walt Good. Cabin doors for R.C. access

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For .60 to 1.20 Engines — 90" Wingspan
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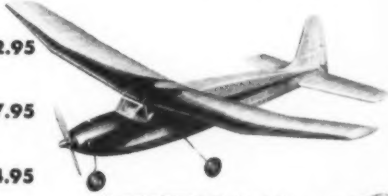
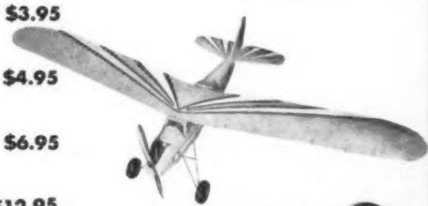
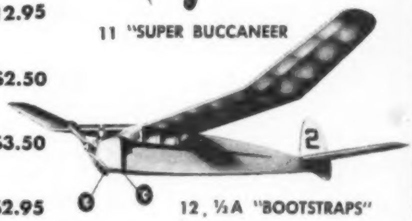


9 BOOTSTRAPS "A-RC"

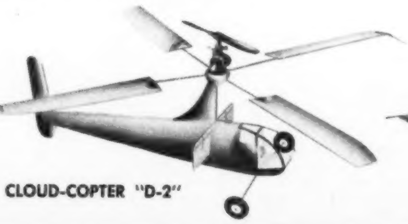
10 "ROYAL RUDDER-BUG"



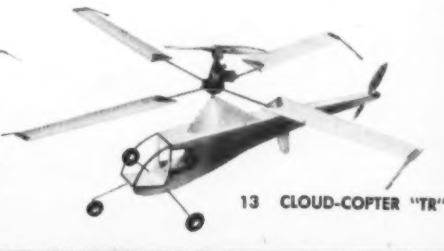
11 "SUPER BUCCANEER



12, ½A "BOOTSTRAPS"



14 CLOUD-COPTER "D-2"



13 CLOUD-COPTER "TR"

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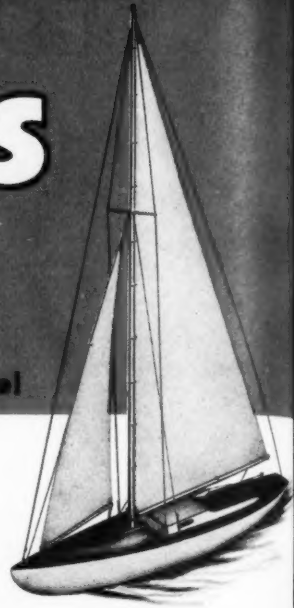

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Chris★Craft "COBRA"

$1\frac{1}{2}'' = 1'$ Scale — $31\frac{1}{2}''$ Long

Build this big Mahogany planked scale replica of Chris•Crafts' 1955 Sport Boat. Engine Compartment completely separated from optional Radio Control gear.

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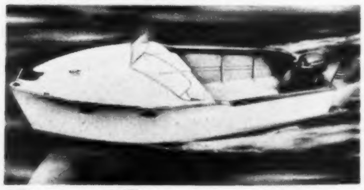

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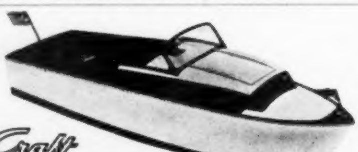

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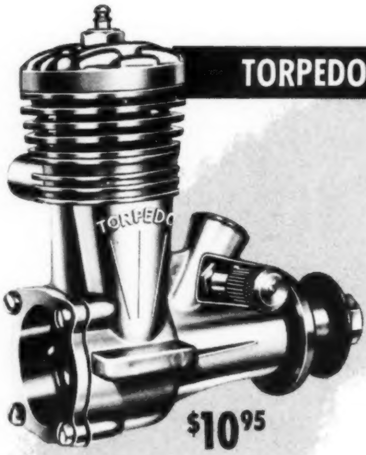

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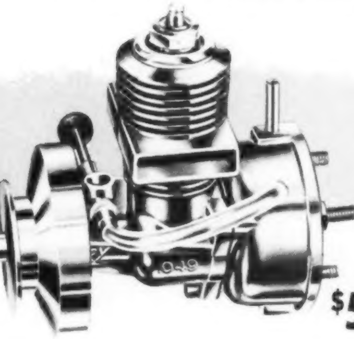

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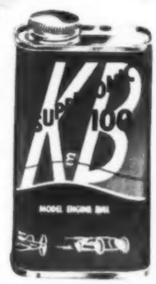

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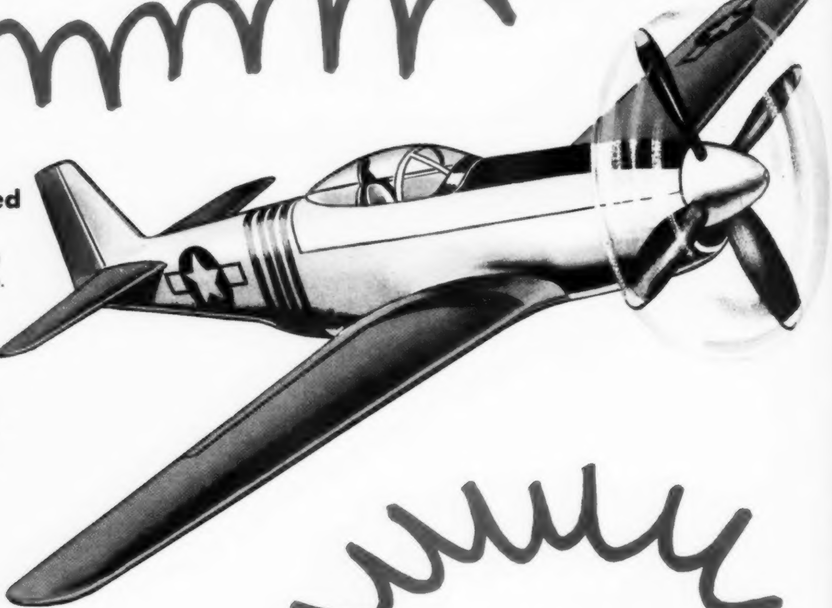

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